

DECEMBER 2003

MODEL **Airplane** NEWS

25 TOP PICKS

WHAT'S HOT FOR
THE HOLIDAYS!

p. 28

GREAT PLANES

U-CAN-DO 3D

AEROBATIC ARF

UP IN
SMOKE!

5 onboard systems

**SOARING
SILENT FLIGHT
SUCCESS TIPS**

WE TEST

- Xtra Easy 2—ready-to-fly trainer
- DJ-1—ducted-fan flying wing
- Stearman—kit-built classic
- Vermont Belle 1300—electric aerobat
- Saito FA-40a—small, powerful 4-stroke

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ON THE COVER: the U-Can-Do 3D .46 from Great Planes is capable of outstanding 3D flight. Check out the full review, which starts on page 56.
THIS PAGE: the Flair Products Stearman PT-17 on one of its many graceful passes.

Smoke and wind

Whether you fly a warbird or an all-out 3D aerobatic machine, nothing adds excitement and realism to your flight routine like a long, puffy trail of white smoke. In his "Onboard RC Smoke System Guide," senior tech editor Gerry Yarrish provides everything you need to know to add a smoke system to your plane—from setup diagrams to an in-depth look at all of the various systems available.



Readers beware! Don't read this issue's guide to soaring unless you're prepared to be captivated by non-powered flight. "Ha!" you might say; "Gliders and sailplanes are boring!" Photo-journalist and longtime *Model Airplane News* contributor Dave Garwood shows just how wrong that belief is. Not only does a glider hold the world speed record (242.9mph!), but these wind-powered planes can race, fly combat and perform aerobatics as well. Check out Dave's article on page 48 and be prepared to join the excitement!

HOLIDAY CHEER

Also in this issue is our annual "Hot for the Holidays," in which we've rounded up 25 of the hottest planes, engines and accessories we've seen this year. From giant-scale aerobats to backyard flyers to dream vacations, you're sure to find something to wish for here. Our best suggestion? Leave the magazine open to this section on the coffee table. We can practically guarantee that you won't receive ties or socks this holiday season! Trust us; your family will appreciate knowing exactly what you want!

IN THE WORKSHOP

"Scale Techniques" guest columnist Charlee Smith follows his October article on producing metal finishes with an easier way to make scale rivets; check out his tips on page 120. In "Powerlines" this month, columnist Greg Gimlick offers a look at electric motor mounts; no matter what your installation needs, you're sure to find the perfect method on page 142.

TRANSATLANTIC FLIGHT

Those of you who were disappointed when you didn't see Maynard Hill's nonstop RC transatlantic crossing in last month's "Final Approach" will be pleased to find that article on the last page of this issue. I apologize for the confusion; I was so excited by the news that I jumped ahead of myself when I wrote the November editorial (pushing my deadline, of course!). I again congratulate Hill and his flight crew for successfully flying their 11-pound RC plane from Newfoundland, Canada, to Ireland this past August, and we look forward to offering you an even closer look at this achievement in a future issue.

Safe landings!

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We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we cannot respond to every one.

SERIOUS SEA FURY

As a few of my RC buddies and I discussed the state of affairs in our hobby, we came to the conclusion that model airplane magazines don't publish information about real kits anymore because of all the ARF models that are sold these days. I have always wanted to build a serious model of a Hawker Sea Fury, and the Top Flite kit has been on my "To build" list for a long time, but I decided to wait until I could read a builder's report. What timing! Your October issue hit the nail square on the head with exactly the information I was looking for. My compliments to both your magazine and to the builder/reviewer Stan Kulesa.

Please do us a favor and continue to review built-up wood kits! They might not be as popular now as they once were, but there's still an eager customer base that wants to build and fly them. Thanks again!

Frank Aldridge
Thomaston, AL

Frank, built-up wood kits will always be a big part of our hobby, and we will indeed continue to review them so our readers will have the information they seek before buying them. As long as the industry sees there is a market for wood kits, I'm sure there will be excellent scale models to build. Be sure to let the manufacturers know



that you and your friends are still interested; they'll listen! GY

PROPER PROPELLER PATTERN

In reference to the October 2003 *Airwaves* letter, "Propeller Puzzle," Gerry Rosebery

need not be perplexed with Gerry Yarrish's propeller advice. Rosebery may be correct in regard to static loads encountered in general carpentry: cut through as little grain material as possible, but when it comes to props, I'll listen to Yarrish. *Props ain't static*. Yarrish's pattern avoids lining up holes along the grain that follows the long axis of the prop. If done as Rosebery suggests, the placement puts holes on that axis that weaken the prop under shearing stresses and subject it to an increased risk of splitting. In aviation, it seems to me that the best method is the line that embraces the least risk. My money's on Yarrish.

John R. White
Wolfeboro, NH

I appreciate your feedback, John. I'm sure we haven't heard the last of this subject, though! GY

BALANCING THE PITTS

I read "How to Install a Gas Engine" in your October 2003 issue, and I installed a Fuji 50 engine in my GP Pitts the same way as was recommended in the article. With this setup, my Pitts is extremely nose-heavy. Did you have the same problem? If so, did you put additional weight in the tail to balance it? I have about 10 flights on mine; it flies well,

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but the landings are really hot. I have to use all of the elevator to level off, so I think I should put some weight in the tail.

Ken Williams [email]

Ken, with everything installed, my model came out at exactly 17 pounds, 1 ounce, ready to fly. Without additional ballast, it balanced almost exactly on the forward CG location (5 inches back from the top wing's leading edge). Double-check to make sure that you are balancing your model at the recommended CG point; don't be afraid to balance it a little back from the 5 inches. My Pitts flies nicely at 5 inches, but it is slightly nose-heavy. For sport flying, I haven't felt it was necessary to move the balance point back. Hope this helps!

GY



LOVING LATEX PAINT

Many thanks to Roy Vaillancourt for his article on painting with latex in the November 2003 issue and for the "Click Trip" on your website (modelairplanenews.com). I have a P-47 all framed and ready for covering, and I think I'd like to give latex a try. I like the idea of getting a perfect match to a color chip, and I know my family will appreciate the absence of toxic fumes coming out of the garage. If my plane looks half as good as Roy's, I'll be very happy. My hat's off to him for sharing this technique with the rest of us!

Steve Mittman [email]

You're welcome, Steve. I enjoyed sharing my tips with Model Airplane News readers. If you have any other questions about latex paint, please email me in care of the magazine at man@airage.com.

Roy Vaillancourt

POPULAR PREDATOR

With all the action going on in the Middle East, you can't help but see combat footage on the evening news. In particular, I have noticed the increased use of military drones for all sorts of combat missions; they even carry video cameras and missiles! Do you have any information on these supersized military RC airplanes? I think it would be a real achievement to build an RC version of one of these aircraft. Any help would be greatly appreciated!

George Popalowski
Riverton, TX

Hey George, you're in luck! We featured an article on this topic in the March 2002 issue of Model Airplane News. I had a wonderful time interviewing several members of the 11th Recon Squadron who are involved in the USAF Unmanned Aerial Vehicle (UAV) program. You are correct in saying that the Predator carries a video camera. In fact, it carries several kinds of cameras, but we know very little about them because of the classified nature of the aircraft.

The Predator was the first UAV type to launch a

laser-guided Hellfire-C missile and destroy a target. The article also features a 3-view drawing of the Predator that you can use to develop your own plans. A scale RC model of the ultimate RC aircraft—neat idea! Have fun and send us a photo or two when you finish building it.

GY ✈



CHECK OUT THE FULL
PREDATOR ARTICLE AND
DOWNLOADABLE CAD FILES

High Strung.



The S546 Flying Wire Kit.

This kit is specified by major kit manufacturers for a reason: It is the most complete Flying Wire/Tail Brace Wire kit you can buy. It contains eight feet of both .032" Stainless Steel Cable and Heavy Duty Kevlar®. It has Gold-N-Clevises, eyebolts, crimp sleeves, nuts, Steel Brackets, couplers — everything needed for a complete circuit around the tail or between wings in any of a dozen variations.

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GETTING BETTER IDEAS OFF THE GROUND

by the Model Airplane News crew

NEW PRODUCTS hit the model airplane market all the time, so here's the inside source for what's hot and where you can get it. Every issue, we sift through product announcements, show reports, rumors and prototypes to let you in on the best and the latest. Remember, you saw it here first!

CARL GOLDBERG

MATRIX 40 EXTREME 3-D

Just like the characters in the movie, the Matrix 40 Extreme 3-D can live in two worlds. This new breed of dual-purpose aircraft flies in the real world with smooth, graceful, accurate flight and can perform an FAI sequence with authority and finesse. Flip that dual-rate switch, and the plane is transformed: it will do torque rolls, waterfalls, Harriers and high-alpha maneuvers. If you're looking for a plane that can fly well in both worlds, check out the Matrix 40 Extreme 3-D. Specs: wingspan—55.25 in.; wing area—662 sq. in.; length—58 in.; price—\$219.99.

Carl Goldberg Products (678) 450-0085; carlgoldbergproducts.com.



bbi

NORTH AFRICAN AVIATORS

These two new additions to the Elite Force WW II collectible series from action-figure manufacturer bbi are geared up for action over the skies of North Africa! The company offers an extensive line of specialized pilot figures produced in approximately 1/6 scale. North African Luftwaffe Oberleutnant Otto Schulz (no. 21135) and RAF Flight Lt. Donald Moore (no. 21121) come outfitted to fly and fight in the heat of the African front. Both wear traditional hot-weather khaki uniforms and are equipped with the finely detailed and historically accurate flight gear for which Elite Force pilot figures are famous. Each figure is faithfully represented and includes such items as goggles, headgear and an oxygen mask, a parachute, life vest, flares and flare gun, maps, a watch and other personal gear. The detail is incredible! If you are a scale modeler or a collector who's looking for the ultimate cockpit accessory for your WW II desert fighter, at \$39.99, bbi's Elite Force pilot figures are a must-have!

bbi; a division of Blue Box Toys (212) 255-8388; blueboxtoys.com.



LISTA INTL. CORP.

Hobbyist Workbench

Featuring a fully integrated modular design, Lista Intl.'s new Hobbyist Workbench is a convenient workspace. With its efficient storage space, it's ideal for a variety of applications, such as the assembly and repair of all kinds of models, including airplanes and helicopters. Configure it to suit your needs; it comes in several widths to provide organized storage for tools, parts and other smaller items. A broad selection of cabinet drawer dividers and partitions allows you to create customized storage that you can change to suit different projects. Available with a stationary riser shelf and a pegboard back panel and overhead cabinets, the workbench can also be equipped with integrated electrical power strips. A choice of work surfaces, including butcher block, plastic laminate and galvanized steel is also available. Prices range from \$1,450 to \$1,860.

Lista Intl. Corp. (800) 722-3020; listaintl.com.



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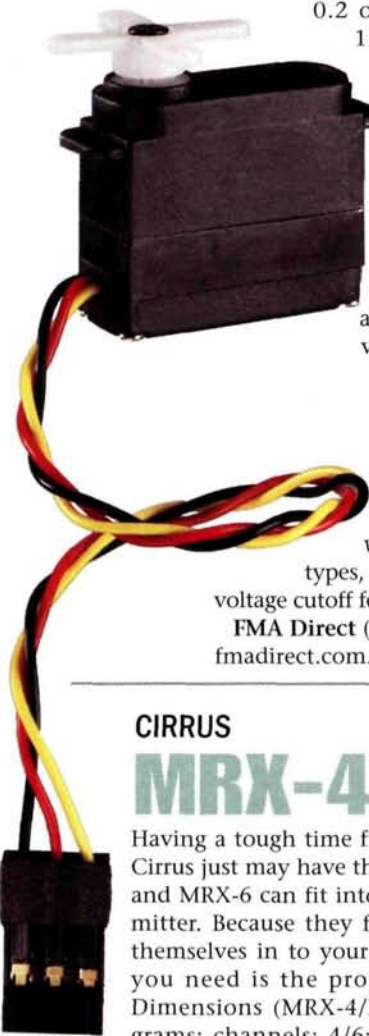
SUBMICRO SERVO AND ESC

From those clever folks at FMA Direct come two new products specially designed for modelers who like to think light and small. The PS20 submicro servo (\$22.95) weighs only 0.2 ounce yet can deliver 12.5 oz.-in. of torque running on 4.8 volts or 15.5 oz.-in. on 6 volts.

For the electric enthusiast, the Super 30 (\$49.95) is a 30A speed control that automatically detects battery voltage and sets the cutoff voltage. It also features a one-time custom setup for throttle endpoints for a more linear throttle response.

The Super 30 works with all battery types, and its brake and low-voltage cutoff features can be disarmed.

FMA Direct (301) 668-7615;
fmadirect.com.



HIROBO

Sky Limbo Max

The popularity of fun-fly models is at an all-time high, and the folks at Hirobo are throwing their hats into the ring with this .40- to .60-size, sport-class ARF. Designed by four-time F3A World Champion Giichi Naruke, the Sky Limbo Max features all-wood construction and comes with all the necessary hardware. If you're ready to explore a few more advanced flight techniques, the no-dihedral, sweptwing Sky Limbo may be just the plane for you. Specs: wingspan—53.1 in.; length—47.6 in.; weight—4.8 to 5.5 lb.; engine req'd—.40 to .50 2-stroke; radio req'd—4-channel with 4 servos; price—\$99.

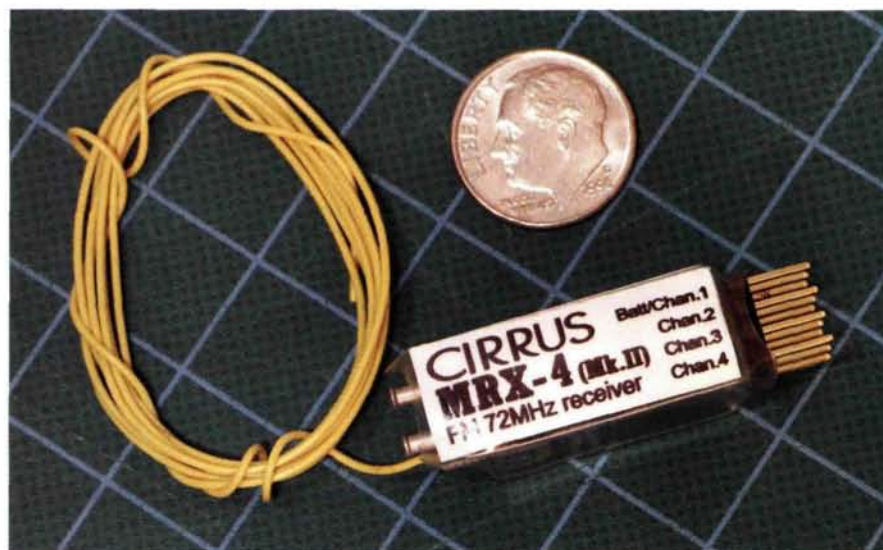
Hirobo; distributed by Model Rectifier Corp. (732) 225-2100;
modelrectifier.com.

CIRRUS

MRX-4 and MRX-6

Having a tough time finding a small receiver to fit that new park flyer? Cirrus just may have the answer to your problem. The new Cirrus MRX-4 and MRX-6 can fit into the tightest spots and will work with any transmitter. Because they feature automatic shift-select, the receivers tune themselves in to your transmitter's signal, regardless of the brand. All you need is the proper frequency crystal (available separately). Dimensions (MRX-4/MRX-6): 10x32x12/10x32x16mm; weight: 9/10 grams; channels: 4/6; range: 500/500 meters; power: 3.5 to 7 volts; tuner: single conversion, narrow band.

Cirrus; distributed by Global Hobby Distributors (800) 854-8471;
globalhobby.com.



WATTAGE

TWIN DUCTED-FAN VIKING

Who hasn't seen news footage of President Bush landing on the USS Abraham Lincoln—"Top Gun"-style—in a Viking jet? Well, here's a spy shot of that jet as reproduced by the WattAge engineers at Global Hobby! That's right; our spies smuggled out photographic evidence of the existence of this blazin' new model, and we'll bring you more info about it as soon as we can. Until then: start drooling!

WattAge; distributed by Global Hobby Distributors (800) 854-8471; (714) 963-0133;
globalhobby.com.

FUTABA

BR2000 & CR2000

Futaba has been a trusted name in radio systems for years, and now it brings its reputation and technological background to battery care! The CR2000 is a new battery charger, and the BR2000 is a new battery discharger and checker. Both units work with Ni-Cd and NiMH packs.

The CR2000 is ideal for charging transmitter and receiver packs and glow-plug igniters. Along with easy, pushbutton operation, it features peak-

charge detection with auto-cutoff and an audio alert, and its LCD screen displays input and output voltage, charge current, peak voltage, charge time and charge reached. It also comes with an adapter for use with a car lighter and alligator clips for use with a field battery or a power supply, plus a 28-inch-long transmitter charge cord and 20- and 80-inch-long receiver charge-adaptor cords. The CR2000 battery charger will retail for \$170.

To check receiver packs with the BR2000, simply connect the pack, set the unit for 4.8, 6,



or 7.2 volts, and push the button. Red (danger), orange (caution), green (attention) and blue (safe) zones on the circular graph clearly indicate voltage status. Holding the button down for 3 seconds starts the discharge function with a current load that can be varied from 1 to 3 amps (slow to fast). The LCD display is backlit in red when it's checking; a blue backlight means it's discharging. A built-in fan keeps the unit cool while it's discharging a battery, and it automatically shuts off when the discharging has been completed. The BR2000 checker and discharger cost \$50.

Futaba; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; futaba-rc.com.

GREAT PLANES

1/3-scale Christen Eagle II ARF

This gorgeous aerobatic performer is one of Great Planes' most realistic biplanes ever! A top-quality performer with gasoline and glow engines, this model has great appeal for intermediate and veteran pilots. It's made of hand-selected wood and expertly covered in Top Flite MonoKote, and it can be flight-ready in just 25 to 30 hours. Scale details include its distinctive "Eagle" trim scheme, fiberglass fairings, interplane struts and cowl and authentic flying-wire locations. Specs: wingspans (top/bottom)—68.5/64.5 in.; wing area—1,436 sq. in.; weight—16.5 to 18 lb.; wing loading—26 to 29 oz./sq. ft.; length—62.5 in.; engine recommended—2- or 4-stroke glow or gasoline; radio req'd—4-channel; price—\$429.99.

Great Planes Model Mfg. Co.; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; greatplanes.com.

GPS FLIGHT

Long-range GPS Flight telemetry

How would you like to track your RC glider, airplane, or helicopter in real time and be able to store its flight data on your computer? Sound cool? Well, GPS Flight offers you this miniature technology in kit form; it includes an integrated antenna, a 900MHz radio and printed circuit boards. Weighing between 60 and 100 grams (depending on the model), the unit can be connected to a home PC using a serial cable. It will send real-time data on altitude, location and vertical speed to a base-station receiver that is hooked up to the PC. Almost any GPS software can be used to monitor and record the flight data. You don't require a ham radio license to operate it, and the circuit boards make it very easy to assemble. Simply insert the components' wires and solder them into place; average assembly time is 20 to 30 minutes, and an online manual provides detailed information. Kits start at \$189.

GPS Flight (425) 246-2117; gpsflight.com. ✦



SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or a one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.



PLUG PROTECTION

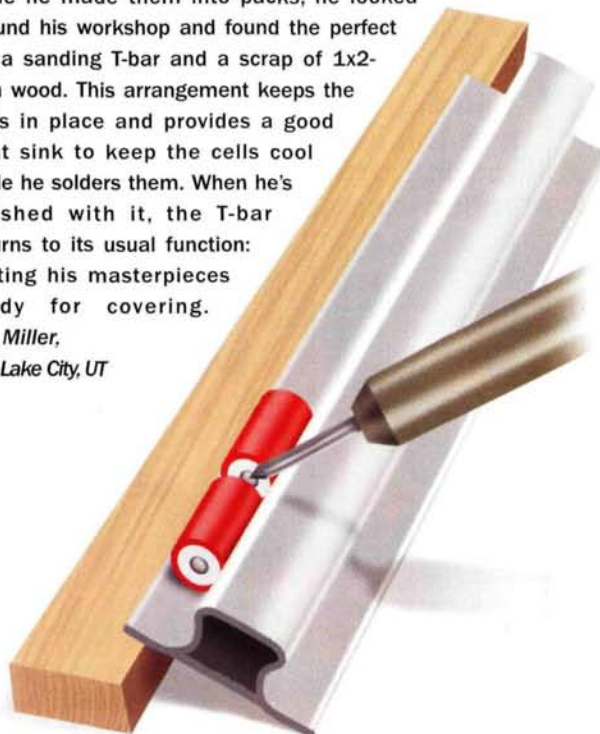
When the banana plugs from his starter kept breaking off and were too easily pulled out of his power panel, Karl looked for a better solution. He found it at RadioShack: a double banana plug that can better handle strain than two single plugs. He colored the negative side with a felt pen and soldered it to his starter. Since he has begun using this system, none of the plugs have broken off or even pulled out! We can't wait to try this one out.

Karl Byman, Longview, WA

NO-FUSS BATTERY JIG

Here's a tip that doesn't require any building, gluing, or soldering! When Jim needed a battery jig to keep his battery cells aligned while he made them into packs, he looked around his workshop and found the perfect fix: a sanding T-bar and a scrap of 1x2-inch wood. This arrangement keeps the cells in place and provides a good heat sink to keep the cells cool while he solders them. When he's finished with it, the T-bar returns to its usual function: getting his masterpieces ready for covering.

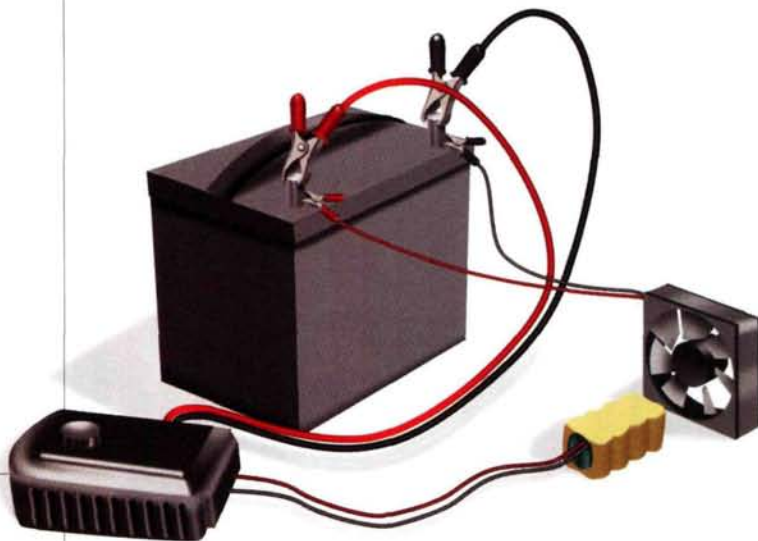
Jim Miller,
Salt Lake City, UT



EASY COOLDOWN

Battery packs heat up enough during flight, so you definitely don't want to put a hot-from-the-recharger battery pack into your plane. Here's an easy way to avoid having to wait for your pack to cool down: hook a fan up to blow cool air over them while they're being charged! Gary found an inexpensive 12V DC computer fan at a computer hardware store, and he uses it to cool the packs while they're being charged. Because the fan runs on 12V DC, he wired it with alligator clips and hooked it directly to the 12V battery source. By the time it has been recharged, the pack is cool and ready for flight.

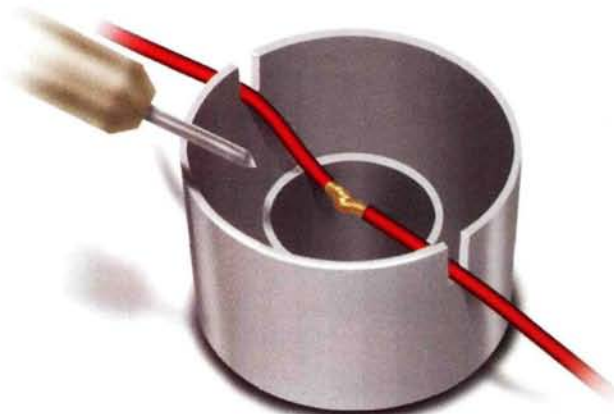
Gary Ritchie, Olympia, WA



HELPING HAND

Ever wish you had a third hand when you solder wires together? Here's the easiest fix we've seen yet! John cut two slits opposite each other on the edge of a spray-can lid and uses them to hold the wires while he solders them. And the best part? You can put the lid back on the can when you've finished! Now, *that's* modeling ingenuity. ✦

John Bruno, St. Ann, MO



SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable, but please do not send digital printouts or Polaroid prints. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.



GREAT PLANES RV-4

Robert E. Lee, Florence, SC

Talk about a dynamic duo! Robert's model, pictured on the runway next to his brother-in-law's full-size RV4, has functional flaps, is covered in MonoKote and painted with LustreKote. It's powered by an O.S. .46FX and uses a Futaba radio with 7 servos. Robert writes that it took him eight months to complete his RV-4, and he adds, "It flies like a dream."

AERONCA C-3 COLLEGIAN

Robert L. Gray, Layton, UT

Robert modified Balsa USA 1/4-scale plans to build this stylish 1/3-scale Aeronca C-3 Collegian. It spans 12 feet, weighs 38 pounds and is covered in Sig Koverall. It uses an O.S. 3.00 for power and has functional flying wires from Proctor Enterprises. This is one "Collegian" that deserves an A+.



P-51

James Sherburn, Lake Havasu City, AZ

Built from a .40-size kit, this Great Planes P-51 is powered by an O.S. .46FX engine with a Slimline Pitts muffler. It's covered in MonoKote dove gray, trimmed in yellow, black and white and controlled by a Futaba T6XA radio with Futaba servos. James writes that the kit was a pleasure to build, and the plane is a very good flyer with no bad habits; no wonder he named it "Sweet Thing"!

STIKOTA

John Delevoryas, San Jose, CA

Based on Joe Wagner's Dakota free-flight biplane, the "Stikota" is powered by a geared Speed 400 electric motor and a 9x5 folding prop. A 600mAh, 8-cell NiMH battery pack supplies the power. To keep it as light as possible, John used FMA Direct's Extreme 5 FM dual-conversion receiver and two FMA S80 servos. Great job, John!



AERONCA 4AC SEDAN

David Swanay, Tyngsborough, MA

David built his Aeronca from a Pica kit that he bought at an auction. With an 86-inch wingspan and weighing 11 pounds, the model is covered with Sig Coverite and painted with Sig dope. It's powered by an O.S. .91 Surpass and uses a Futaba FP-T7UAF radio. Going once—going twice—we're sold!



SCRATCH-BUILT KRIER KRAFT

Tony Priebay, Lecanto, FL

Tony tells us that his yellow Krier Kraft is a homebuilt aerobat. It's covered with Hangar 9 Ultracote, powered by a Saito Golden Knight .91 engine and controlled by a JR radio. He adds, "... this was a great project and a great flyer!" Thanks for sending in the photo, Tony.

SIG FOUR-STAR 60

Blake Pentecost,

Langley, British Columbia, Canada

Talk about a work in progress; Blake has been flying his Sig Four-Star 60 since 1998 but has modified it annually since then. In the beginning, it had a motorized sliding canopy and Williams Bros. wheels; then it acquired carved wingtips and fiberglass landing gear. Most recently, Blake added a Saito .91 on Du-Bro anti-vibration mounts, an APC 14x8 pattern prop, a homemade fiberglass cowl and exhaust and a radial engine. In other words, like most of us, the model has gained a little weight every winter, but, says Blake, "It still takes off and flies most stunts at 1/2 throttle."



Fokkers to the Left & Fokkers to the Right

1/4 Scale ARF



Design By Balsa USA

1/5 Scale ARF



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P-40E

John Fischer, Plainfield, IL

John's latest project, this $\frac{1}{5}$ -scale Pica P-40E, weighs 26½ pounds and spans 86 inches. It's powered by a Zenoah G-45 gas engine turning a Zinger 20x6 3-blade prop. Made of built-up balsa and plywood glassed with $\frac{1}{2}$ -ounce cloth and finished with automotive paint, the P-40E also has functional flaps and retracts. Its details include hand-painted graphics and scale panel lines with 7,000 rivets. John and his helpers spent 3½ years and more than 3,000 hours completing this incredible model. Congratulations on a job well done!

SPITFIRE MK. IX

Arnold McIntyre, London, Ontario, Canada

Arnold's Spitfire was built from a $\frac{1}{6}$ -scale semi-kit. It's powered by an O.S. 1.08ci engine and is controlled by a Futaba 6-channel radio. It has an all-up weight of 15 pounds wet with about 1 pound of nose weight. Arnold rebuilt the plane after a major mishap and hasn't yet flown it again, but he's certain that it will fly as well as it ever did. He says, "It's difficult to stall, due mainly to a very scale wing." ✈

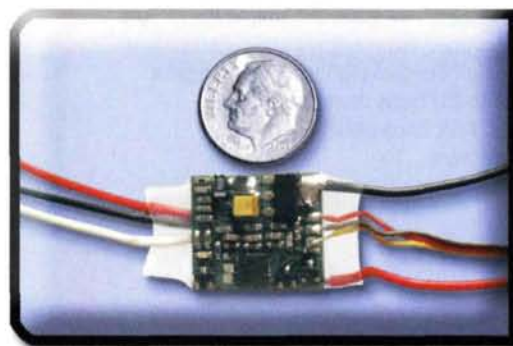


NEW! Phoenix-10 Micro!

Sensorless, Brushless Speed Control

Introducing the Phoenix-10 Micro! If you thought the Castle Creations' Phoenix-10 was tiny and full-featured you won't believe the all new Phoenix-10 Micro. Considerably smaller than the Phoenix-10, the new micro version still handles 10 amps continuous current and has all the great features of the Phoenix ESC line. The smallest brushless ESC on the market and still all the great Castle Creations' programming options.

Dimensions: .73" x .8" • Weight (w/wires): 6g (.21 oz)



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HOT *for the* holidays *25 yuletide treasures*

by the Model
Airplane News crew

Let's see: neighborhoods are ablaze with the glow of a million tiny lights adorning the trees in front of every house on the block, and you have a better chance of winning the lottery than you do of getting a parking spot within a one-mile radius of the mall; yup, it must be the holiday season! Santa already made his list and is in the process of checking it twice, so we figured that we'd better start ours. Once again, we gathered around the ol' yule log, sipped some eggnog and reflected fondly on all the cool products that brought a grin to our faces during the past year. And, once again, there were

many more than we have room to mention here (definitely more than would fit in the old sleigh). So we thought we'd give Rudolph and the rest of the reindeer a break and narrow the list down to these 25. Here's a look at what we'd love to find under our trees!

GREAT PLANES PATTY WAGSTAFF EXTRA 300S & FUJI BT-50SB ENGINE

Giant-scale stocking stuffer

Hoping for a little something extra from Santa this year? How about a big something Extra? Well, they don't get much bigger than this 78-inch-wingspan, IMAA-legal Extra 300S. This 1/4-scale tribute to world champion aerobatic pilot and aviation pioneer Patty Wagstaff features built-up wood construction with plug-in wing and stabilizers and comes almost ready to fly. It sells for \$399.99.

Of course, a model of this size requires



plenty of power.

Our suggestion? You could hope that Santa's feeling mighty generous this year and ask for the new Fuji BT-50SB to go with it. This 46.5cc gas powerhouse features a butterfly carburetor and is the perfect companion to Patty's Extra. But if jolly old St. Nick doesn't come through for you, you can pick one up yourself for \$399.99.

Great Planes Model Mfg.; distributed by
Great Planes Model Distributors (217) 398-6300;
(800) 682-8948; greatplanes.com.

Fuji; distributed by Great Planes; fujiengines.com.



GWS

MESSerschmitt, SPITfire, A-10, ZERO, MUSTANG, B-2 & CORSAIR

Make a list

Why ask for just one when you could fit an entire squadron of these pint-size warbirds under your tree? Truth is, you'll have a tough time deciding which one you want most, anyway. Of course, nothing's as simple as it seems, and these warbirds don't come out of the box looking this great. (The Spitfire and Messerschmitt pictured here were custom-painted.) And once painted, these foamie fighters are among the most realistic-looking backyard flyers on the market today, which explains why they're also the most popular. Pick up one (or seven), and see for yourself. They range in price from \$59.99 to \$79.99.

GWS; distributed by Horizon Hobby Inc. (217) 355-9511; horizonhobby.com; gws.com.tw.

ZAP GLUE PACK

The gift that keeps on giving

From fruits to crackers, candies to cheese, wines, bubble baths and everything in between—gift baskets come in just about every shape, size and variety imaginable. And while they always make a great gift, there's nothing quite like watching that delivery guy walk up to your front door with a box full of ZAP goodies. Whether you need kicker, epoxy, thread-lock, or resin, chances are, ZAP has the perfect glue to meet your modeling needs.

ZAP; distributed by Pacer Technology (800) 538-3091; zapglue.com.



RCX

CALIFORNIA DREAMIN'

If the weather outside is frightful where you live this spring, why not head to Southern California? It will be the place to be April 23 to 25, 2004, because that's when thousands of radio-control enthusiasts will descend on the Anaheim Convention Center for the 2nd Annual Radio Control Expo (RCX). With demos, races, contests and prizes, RCX 2004 promises to once again enthrall and amaze all who attend. Hop on a plane, board a bus, ride the rails, or just start walking, but don't miss your chance to check out the hottest new planes, boats, cars and gear on the market.

GIANTSscalePLANES.COM

F6F HELLCAT

Yuletide treat

Granted, the Pacific's most fearsome fighter certainly isn't the most heart-warming holiday image, but we're pretty sure you'd have a tough time hiding a grin should you find this giantscaleplanes.com Hellcat under your tree on Christmas morning! The Hellcat ARF features built-up balsa wings, tailpieces and control surfaces and features a molded-fiberglass fuselage, cowl and belly pan. Best of all, this scale beauty can be yours for just \$350 (or a really nice letter to Santa!).

Giantscaleplanes.com (610) 282-4811; giantscaleplanes.com.



HITEC

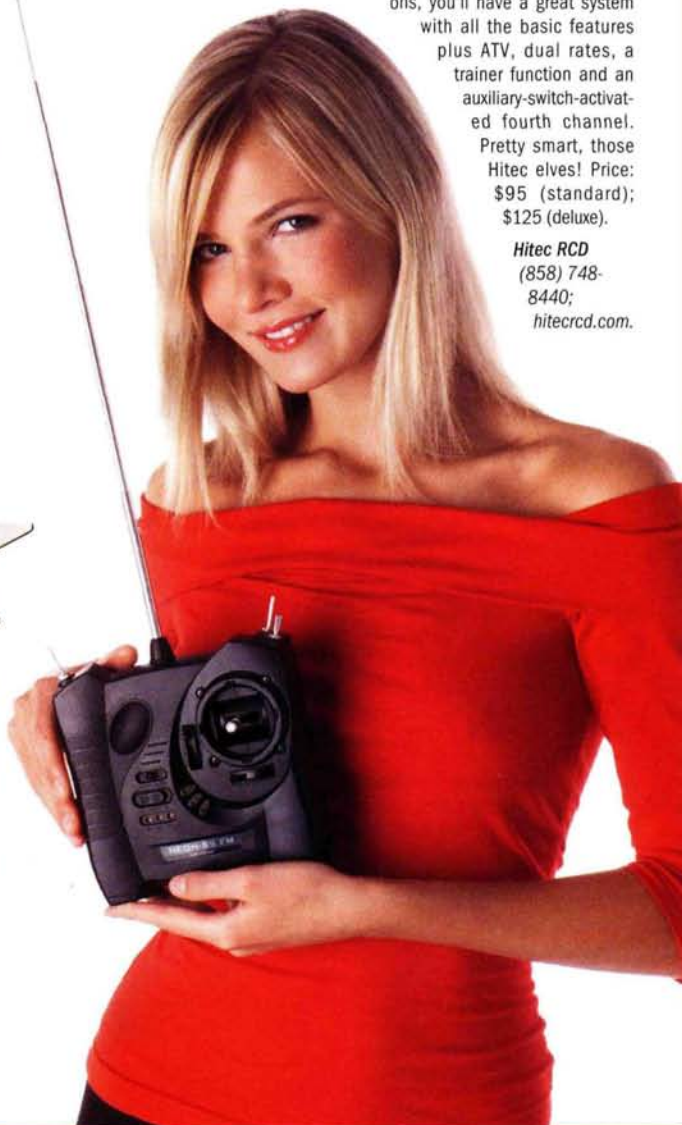
NEON

On the nice list

Isn't it always the way? You get a nice present and you use it for a while, and then you wish it had more features. From cars and motorcycles to stereo systems and home computers, it seems like no time at all before we want an upgrade! The elves at Hitec know this all too well, and so they used their magic to produce the upgradable Neon radio system. Out of the box, it's a basic 3-channel, single-stick radio. With all the add-ons, you'll have a great system

with all the basic features plus ATV, dual rates, a trainer function and an auxiliary-switch-activated fourth channel. Pretty smart, those Hitec elves! Price: \$95 (standard); \$125 (deluxe).

Hitec RCD
(858) 748-8440;
hitecrd.com.





DU-BRO CARE PACKAGE

Stocking stuffers for all modelers

Santa is always looking for stocking stuffers, and what could be better than an assortment of Du-Bro goodies? If you're into park flyers, Du-Bro has you covered with micro control horns, bell-cranks, pushrods, connectors, wheels and even skis for winter-wonderland flying. And all you pilots who fly glow-powered and giant-scale models needn't worry; Santa hasn't forgotten you. Du-Bro can also keep you guys flying all year round with many high-quality items—from airplane accessories to tools—to make your modeling experience a pleasant one. What more could anyone ask for?

Du-Bro Products (800) 848-9411;
dubro.com.



HANGAR 9 46% ULTIMATE

The Ultimate gift

If you like 'em big and powerful with two wings, then Hangar 9's 46% TOC Ultimate ARF would be awesome parked somewhere next to your Christmas tree—it surely won't fit under it! Designed specifically for big 150cc twin-cylinder gas engines, the Ultimate is aptly named for the best present any giant-scale modeler could wish for! For just under \$1,700, you'll have to be extra nice to get this biplane!

Hangar 9; distributed by Horizon Hobby Inc. (800) 338-4639;
horizonhobby.com.



MODEL TECH MAGIC FUN FLY ARF

In the air

Holidays are truly a magical time of year, and a gift that will perform all sorts of 3D tricks is the Magic Fun Fly ARF from Global. This purpose-built aerobat is a popular competition design from the UK, and it can really fly up a storm! Its simple design and large control surfaces maximize the performance envelope and minimize the building time. It's also priced at less than \$100! Not bad for a .40-size anything these days! If you're in the mood for 10 loops-a-looping or nine rolls-a-rolling, the Magic has you covered!

Model Tech; distributed by Global Hobby Distributors (800) 854-8471;
(714) 963-0133; globalhobby.com.

TRU-TURN SPINNER ASSORTMENT

Shiny and bright

These all-aluminum spinners from Tru-Turn are beautifully machined and balanced, and like silver bells, they're also pretty enough to hang on your Christmas tree! Uh, OK; maybe only if you're a true diehard modeler would you use them as ornaments. Available in several popular sizes and styles, each spinner has a machined backplate that mates perfectly to the spinner cone. The spinners come with their slots precisely cut to fit many brands of propellers, and several prop-shaft adapter kits are available to fit practically every engine known to man! Ranging from 1½ to 6 inches in diameter, Tru-Turn spinners are special presents we should all give ourselves—and not just during the holidays!

Tru-Turn; distributed by Romco Mfg.
(713) 943-1867; tru-turn.com.



LANIER RC MARINER 40

On land, on sea and in the air

Featuring built-up balsa and lite-ply and covered with iron-on film, this dandy little ARF will please the sailors and the landlubbers on your gift list. Available in three color schemes, the Mariner 40 sport seaplane assembles easily, looks great and flies smoothly at all speeds. Whether your terra is firma or of the liquid variety, you'll have a ball with the Mariner 40! It sells for just \$249.

Lanier RC (770) 532-6401; lanierrc.com.



HIROBO MINI LAMA XRB

Let it snow, let it snow, let it snow

If Santa leaves this miniature scale wonder under your tree, we have a feeling that being trapped in the house this winter suddenly won't seem so bad. Not only does the Mini Lama look really cool, but it also comes completely ready to fly! Designed specifically for beginners, this tiny trainer heli is durable and stable. Best of all, it can take off from your coffee table! Sure, it's tethered to the radio and plugged into the wall, but 10 minutes at the sticks of this baby, and you'll have so much fun that you wouldn't notice if Santa landed on your roof, never mind a couple cords—trust us! It sells for \$299.

Hirobo; distributed by MRC (732) 225-6360; modelrectifier.com.



FMA DIRECT

FLIGHT SYSTEMS 5

And visions of sugarplums danced in the sky

Here's a great gift for the novice pilot and newcomer—the FMA Direct Flight Systems 5 (FS5). It's as close as you can get to having an autopilot in a model airplane for virtually crash-proof flying. When used with the Co-Pilot, this system will put your model in a programmed holding pattern or in a slow descent if the receiver loses signal or detects interference. The FS5 works with PPM as well as PCM transmitters in both positive and negative shifts. When Santa has finished his appointed rounds, he uses the included PC viewer software to check and record airborne telemetry, battery voltage, interference and more. The FS5 receiver, Co-Pilot and software cost \$179.95; if you already have the Co-Pilot, the package costs \$119.95.

FMA Direct (800) 343-2934; fmadirect.com.

AIRTRONICS RD8000

8-channel champ

Here's something that will have you jumping for joy when you find it among your holiday gifts: the Airtronics RD8000 8-channel, 10-model-memory computer radio. Developed for use with aircraft (both powered and sailplane) and helis, it's available in 72 and 75MHz. It comes with a very detailed instruction manual, is easy to program and, best of all, it's expandable. You may need only the basic menu features right now, but by the time summer rolls around, you could be ready for the RD8000's more advanced functions. It's so versatile, in fact, that it could be the last radio you'll ever need! Prices range from \$299.99 to \$469.99 (depending on flight pack).

Airtronics (714) 978-1895; airtronics.net.



HOBBY LOBBY

PROJETI

Faster than a speeding sleigh

Rudolph confessed to Santa that even he has a hard time keeping up with the Projeti. And it's no wonder that he can't, what with its 32-inch span and light weight. The molded, foam-injected model comes in one piece and requires a minimum of effort to build, perfect for those cold winter nights. The Projeti is available in three colorful paint schemes and requires a Speed 400 power system and 8-cell, 1700mAh NiMH battery. At a cost of only \$99, even Scrooge can afford this fast flyer.

Hobby Lobby (615) 373-1444; hobby-lobby.com.

TOP FLITE **T-34B MENTOR & ROBERT SCALE RETRACTS**

Build some fun for 2004

Looking to scale down those Christmas bills this year for the giant-scale modeler on your gift list? Then look no further than Top Flite's Gold Edition Mentor. This classic warbird trainer is loaded with scale details, features a durable heavy-duty ABS cowl and tail cone and is priced at just \$199.99. Its interlocking Gold Edition engineering makes building this 80-inch-span, 1/5-scale replica a snap. To really deck the halls ... er, the model, why not add Robert's pneumatic retractable landing gear? Designed specifically for the Mentor, this shock-absorbing gear is made of aircraft steel and aluminum that add the finishing touch. It costs \$308.99.

Top Flite; distributed by Great Planes Model Distributors (800) 682-8948, (217) 398-6300; top-flite.com.

Robert Mfg. Inc. (630) 584-7616; robert.com.



SUPER KRAFT
MONOCOUPÉ

Flights of Christmas past

Santa will need a big stocking for this sucker! The Monocoupe is a classic racer that left its mark during the Golden Age of aviation, and it spans a whopping 96 inches! The elves at Super Kraft use only high-quality materials in the Monocoupe's construction and then cover it in a striking color scheme. Priced at \$399.77, this giant-scale ARF abounds with excellent hardware, so you won't need to take your sleigh out to visit your local hobby shop during snowstorms. Just add your favorite .91 to 1.8 gas or glow engine to complete the package.

Super Kraft; distributed by Kangke Industrial USA Inc. (877) 203-2377; (631) 274-3058; kangkeusa.com.

WATTAGE
DECATHLON EP

Good things come in small packages

Park flyers make great gifts, especially those that are as cute as the WattAge Decathlon EP. The colorful Decathlon spans almost 29 inches, and with its 4-channel-control geared WattAge 370 power set, it's capable of delivering exciting aerobatics, just like its bigger, full-scale brother. The Decathlon costs \$65 and is



expertly built and covered by Santa's elves. Speaking of Santa, we hear that he likes to keep a Decathlon in the back of his sleigh for that spur-of-the-moment flight as he makes his rounds.

WattAge; distributed by Global Hobby Distributors (714) 963-0133; globalhobby.com.



SLIMLINE
HOLIDAY PACKAGE

Stocking stuffers

Long the manufacturer of high-quality, long-lasting mufflers and fuel-system accessories, Slimline products should be on everyone's holiday shopping list! Start off with a Pro Connection fuel bottle cap and a Boxer electric fuel pump, then add a few Excel Fueler fittings, and throw in a large-volume Slimline muffler (with or without smoke), and you'll have a holiday package fit for the most discriminating modeler.

Slimline (480) 967-5053; slimlineproducts.com.

THUNDER TIGER
RAPTOR 30 V2

Incoming!

The latest version of Thunder Tiger's famous Raptor helicopter epitomizes the phrase "new and improved." Its canopy is sleeker than its forebear's, and its collective-pitch-control arm has been strengthened to better handle the stresses of aggressive 3D maneuvers. It has a tougher, larger-diameter engine clutch, and its main frames have been strengthened as well. The Raptor 30 V2 is a fine-quality flying machine that's reasonably priced (\$264.95), has solid performance and will make a fantastic gift for whirlybird pilots of all skill levels.

Thunder Tiger; distributed by Ace Hobby Distributors (949) 833 0088; acehobby.com.





SIG MFG. CURTISS JN-4

Jingle-bell Jenny

If ever there was a barnstormer, then the classic Curtiss JN-4 Jenny is it! Just take the Jenny's Golden Era appeal and turn it into an up-to-date backyard flyer package, and you're sure to have a winner on your hands! And that's exactly what Sig Mfg. has with its 32-inch-span Jenny ARF. Complete with a 180-gear motor and prop, this super-lightweight biplane is made of durable injected-molded foam and comes finished as you see it here. No painting this holiday present! And best of all, besides how nice it flies, this one will fit fully assembled under even the smallest Christmas tree! Just add your own radio gear, slide on the decals, and you're ready for some "Great Waldo Pepper" hedge hoppin'! Oh, Santa; please add this one to my list! Price: \$59.

Sig Mfg. Co. Inc. (800) 247-5008;
(515) 623-5154; sigmfg.com.

THE WORLD MODEL MFG. CO. ZERO FIGHTER

Giant-scale ARF for giant-size fun

If you leave out a bunch of cheeses for Santa instead of cookies, I'll bet he'll leave you a giant-scale The World Model Zero Fighter in return. The Zero is its latest offering, and it requires a 1.60 2-stroke and a 6-channel radio. The fiberglass fuselage is hand-painted and has rivet and panel-line details molded right in. Best of all, this classic 80-inch-span fighter comes almost ready to fly, with spring-loaded retractors already installed. With its 2-piece wing and detachable stabilizer, you'll be able to easily store it in your Christmas stocking. At a cost of only \$549.99, Santa will hand out a lot of these!

The World Model Mfg. Co.; distributed by AirBorne Models LLC
(925) 371-0922; airborne-models.com.

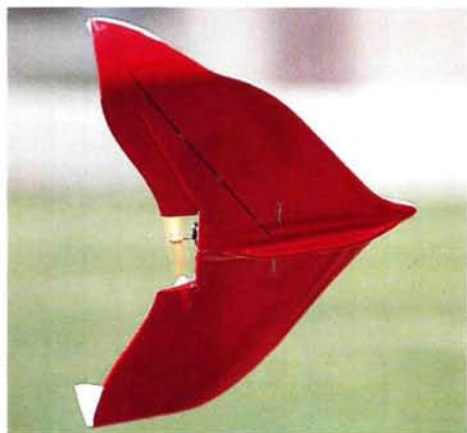


TRICK R/C Zagi FIXX

Nice and easy

There's no better way to say "Happy holidays" than to give the modeler on your list a quick-building, easy-flying model, and Santa heartily recommends the Zagi FIXX. Molded of Z-Foam, the Zagi FIXX is virtually indestructible. The really cool thing, though (besides the weather outside), is that there's only one glue joint on the entire model! It doesn't get much easier than that. Just add a 3-channel radio and two sub-microservos, and you'll be airborne before all the presents have been unwrapped. The Zagi FIXX is priced at just \$150.

Trick R/C (310) 301-1614; zagi.com.



ZENOAH G-26

Big performance in a little package!

If you like burning gas instead of nitro but don't want to give up performance, then the new Zenoah G-26 is a dynamite package any modeler will love! The same size as the ever-popular G-23, the new engine is a drop-in swap out with a whole lot more power! Bigger carb, more porting and the ability to turn bigger props faster all add up to a nice firewall-forward refit. Best of all, it's a Zenoah! Price: \$299.99. ⚡

Zenoah; distributed by Horizon Hobby Dist. (800) 338-4639; horizonhobby.com.



TOWER HOBBIES EASY TOTE PREBUILT DELUXE

Carry on, Santa!

This is just what St. Nick needs to schlep all those goodies around the globe! Tower Hobbies' Easy Tote Prebuilt Deluxe Combo is the crème de la crème of field boxes. It features a large top tray and a deep drawer that hold tools, glow starters, etc. It comes with a 4-way prop wrench, a 1/2-gallon fuel jug (and the necessary fittings to fill it) and a 4-step, standard prop-shaft reamer—all from Great Planes. A 12V Power Core charger with LED, a Power Core MKII starter pack, 5 feet of recoil fuel tubing and a standard Hot Shot 2, all from Hobbico, are also included, as is Tower's own deluxe 12V Power Starter. This incredibly useful bundle of joy costs only \$116.99.

Tower Hobbies (800) 637-4989; towerhobbies.com.



by Gerry Yarrish

Onboard RC

Smoke

Adding a smoke system is a great way to spice up your plane! A long white trail of puffy smoke always grabs attention. Several complete smoke systems are now on the market, and it's really easy to add this exciting airshow feature to almost any model airplane. When it comes to having fun, aircraft that smoke are a good thing!

The basic ingredients for any smoke system are smoke fluid, a separate smoke-fluid tank and an onboard pump to deliver the fluid to the engine's hot muffler. To make nice, dense smoke, the fluid has to atomize as it meets the hot engine exhaust. The hotter, the better, and one of the reasons why gasoline engines produce such wonderful smoke trails is their extremely high exhaust temperatures! Several manufacturers make excellent smoke mufflers, but when it comes to complete smoke-pump packages, there are just a few to consider. This roundup highlights the most popular systems for producing smoke.



System Guide

Where there's smoke, there's excitement!



PHOTOS BY DERON NEBLETT & DEBRA CLEGGHORN

TEJERA MICROSYSTEMS ENGINEERING SIMPLE SMOKE PUMP II



The TME Simple Smoke Pump II is available in several versions; the Deluxe kit is shown here.

PUMP TYPE: electric (complete system)

PRICE: Deluxe kit \$89.95; Regular kit \$79.95; Basic kit \$34.95

COMMENTS: choose from three kit models; the Deluxe is the most complete. It includes a special RF suppressed gear pump, the "Simple Switch" with universal connectors, 4 feet of heavy-duty Tygon tubing, a remote flow-adjustment valve, a high-volume check valve and a T-fitting for twin engines. Also included are complete hookup instructions and the "Secret Smoke Success Tips" booklet written by Albert Tejera. The system requires a 4.8 to 6V battery pack for power. The Regular kit includes everything except the tubing and the check valve. The Basic kit includes only the pump and instructions and is ideal for do-it-yourselfers and as a replacement.

Tejera Microsystems Engineering (TME)
(800) 729-9210; tmenet.com.

SULLIVAN PRODUCTS SKYWRITER



The SkyWriter smoke system is one of the newest on the market; it's compact, self-contained and requires a separate battery pack for power. You can adjust the fluid flow with your transmitter.

PUMP TYPE: electric
(self-contained system)

PRICE: \$89.95

COMMENTS: this electronically controlled smoke pump features the same ultrasonically sealed direct-drive pump head as is used on standard Sullivan electric fuel pumps. It has a miniature microprocessor-controlled, electronic-pulse-drive speed control. You can set the smoke-fluid-flow rate with the transmitter trim and mix the smoke operation with the throttle channel, if desired. It comes with a check valve and an in-line filter, and it requires a separate 6- to 12V battery pack.

Sullivan Products (410) 732-3500;
sullivanproducts.com.

B&B SPECIALTIES SUPER SMOKE PUMPER

PUMP TYPE: diaphragm (complete system)

PRICE: \$49.95

COMMENTS: working off engine-case pulse pressure, this system includes a heavy-duty, high-volume smoke-fluid pump, a control valve, smoke-fluid tubing and all the fittings required for easy installation. The Super Smoke Pumper does not include the smoke-generating muffler or smoke fuel tank.

B&B Specialties (219) 277-0499; bennettbuilt.com.



One of the oldest, best-known systems is the B&B Specialties Super Smoke Pumper! It comes with everything you see here.

TAMJETS VARIABLE-PRESSURE SMOKE SYSTEM

PUMP TYPE: high-pressure electric
(complete system)

PRICE: \$195

COMMENTS: designed specifically for turbine-powered jet models, this complete smoke system comes with everything except a tank to hold the smoke fluid. The pump, mount, battery pack, steel smoke nozzles, flexible tubing, T-fittings and an on/off valve are all included. The Tamjets smoke system comes with a full set of instructions.

Tamjets (408) 224-7600; tamjets.com.



This smoke system from Tamjets is specially designed for use with turbine-powered jet models. It comes complete with two steel smoke nozzles to inject the smoke fluid into the hot turbine-exhaust stream!

SLIMLINE PRODUCTS SHOWTIME PRO & SHOWTIME SPORT



Slimline has two great onboard smoke pump systems. The Showtime Pro (right) comes with its own battery inside its aluminum case, while the Showtime Sport requires a separate battery pack. Both are adjustable from the transmitter.

PUMP TYPE: electric (self-contained system)

PRICE: Pro \$159.99; Sport \$119.99

COMMENTS: the Showtime Pro features programmable-flow technology that controls flow rate through your transmitter. It has a self-contained 6V, 600mAh NiMH battery. It features a maintenance-free ultrasonically welded pump head and a CNC-machined billet-aluminum case with quick-mount thumbscrews. Mounting hardware, smoke tubing and F1 fittings are also included.

The Showtime Sport has all the same features as the Pro model, but it is designed to use a separate 4.8 to 12V battery pack (not included).

Slimline Mfg. (480) 967-5053; slimlineproducts.com.



Smoke tanks are available in several sizes and styles. B&B Specialties tanks come with all the fittings and hardware needed.



Super Dri Aviation Smoke Oil is used with full-size aerobatic airplanes! It's the real stuff. You can get it from MDW Aviation Associates.

SMOKE FLUIDS

Modelers have used many different chemicals and oils in the pursuit of making smoke, and the two most popular homebrews are no. 2 diesel oil and automatic transmission fluid. I have tried the diesel oil, but it has a strong odor and can leave a residue on your model if it hasn't been heated enough to completely atomize. Another popular substance is a release agent used in the construction industry: Carvea no. 22 is used for pouring concrete foundations and is often referred to as "form oil." I have mixed it with Marvel Mystery Oil with good results. By far the easiest way to get smoke fluid, though, is to buy it from a hobby supplier.

B&B Specialties smoke fluid is an old favorite and has been available for many years. Used with a properly adjusted smoke system, it produces smoke "hang time" that's about three times longer than diesel oil's.

Super Dri Aviation Smoke Oil is quickly becoming very popular with giant-scale modelers. It's the real stuff! Super Dri, available from MDW Aviation Associates, is exactly the same fluid as that used by full-size airshow pilots when they make smoke! It produces dense, long-lasting smoke, and it isn't volatile. It doesn't attack foam, either, so it's easy to handle.

Store these fluids in cool, dry areas; and whenever you use any type of smoke fluid, do so only outdoors, and heed all safety instructions.



No need to mix your own fluid! B&B Specialties Bennett's Best smoke fluid produces gobs of smoke and is readily available.



Specially designed to pump smoke-fluid and diesel fuel, Sullivan's 12V Streamer will quickly top off your smoke-fluid tank.



Simple as can be, the B&B Specialties Smoke Wizard offers an inexpensive way to fill your model's smoke tank.

THE PLUMBING

Besides another tank and a pump, you should also use an in-line filter between the tank and the pump and a check valve between the pump and the muffler. And here's an important detail: set up your smoke system so that the pump draws the fluid from the tank. Don't use the pump to pressurize the smoke tank; pressurized smoke systems almost always leak.

There are two types of pumps: electrical and diaphragm (driven by engine-crankcase pressure). For a diaphragm pump to operate, it must be connected to the crankcase pressure from your engine. Install a pressure tap in the engine case, and place it so the opening is free of any reciprocating parts. Also, for optimum performance, keep the pressure line from the engine as short as possible. Diaphragm pumps are on whenever your engine is running, so you must install a good on/off valve between the pump and the tank.

It's also important to have a way to regulate the amount of fluid that is delivered to the muffler. If you pump too much fluid into your muffler, it will decrease the amount of smoke produced because too much fluid lowers muffler temperature, and at lower rpm, it can also kill your engine.

A simple wheel collar slipped over the fluid-supply line between the tank and the pump is an easy way to regulate fluid flow. If you tighten the

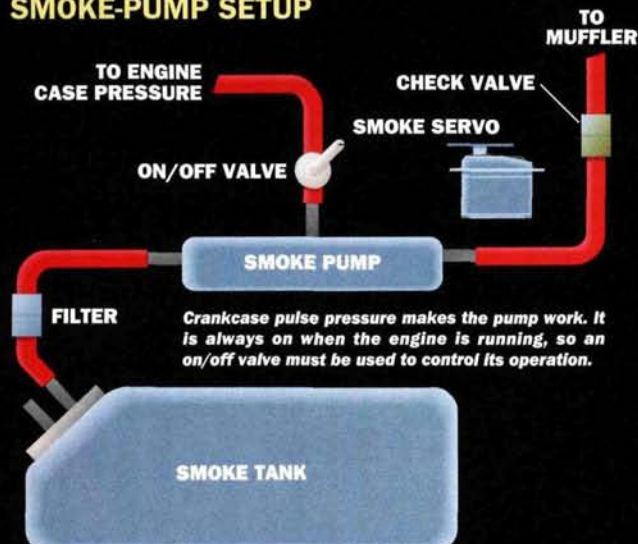
setscrew (be sure to grind off the sharp tip), less fluid will flow through.

Another easy way to regulate fluid flow is to use a remote needle-valve assembly in place of the locking collar. Make your adjustments while the engine and smoke system are running. Start with a small flow, and then open it slowly until the smoke starts to become less dense; then decrease the flow slightly again. A great feature of the newer, self-contained smoke systems is that you can adjust the amount of smoke with an auxiliary radio channel. No other hardware is required.

Check valves provide a positive fluid shutoff when the pump is turned off. They also prevent the muffler from adding backpressure to the tank. I also use wire clamps or twist-ties to secure all the line connections in the system—just in case.

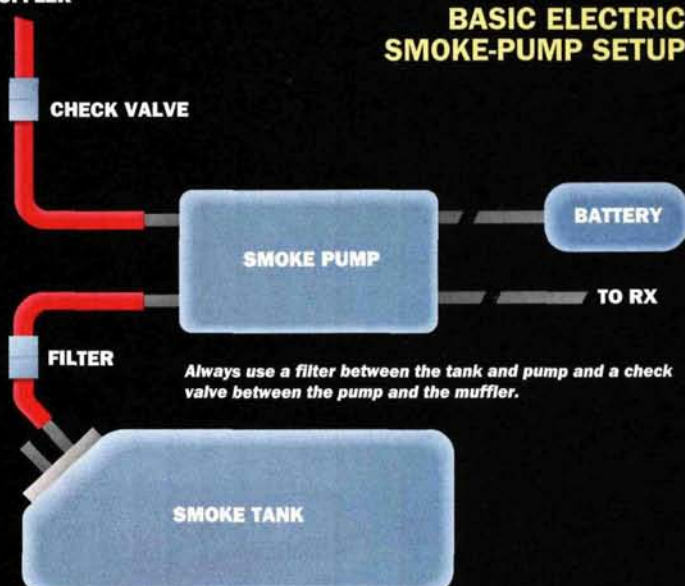
Though it will take some trial and error, most models require about 2 ounces of fluid per minute to produce good smoke. A 16-ounce tank is good for about 8 minutes of smoke-on time. Position the smoke tank close to the center of gravity so trim changes will be minimal as you burn off the fluid. You can use glow-fuel tubing, Tygon gasoline line, automotive vacuum line (neoprene), or clear vinyl tubing from the hardware store. All work well with smoke fluid. But to be safe, check it out before you try something new.

BASIC DIAPHRAGM SMOKE-PUMP SETUP



TO MUFFLER

BASIC ELECTRIC SMOKE-PUMP SETUP



SMOKE ON!

To maximize your fluid supply, fly your model like a show pilot. Turn on smoke just before a maneuver, and turn it off immediately as you exit it. Guys who fly all over the place with their smoke turned on don't look impressive and only waste fluid. With a smoke trail, it's easier to set up and keep track of your maneuvers. Smoke paints a great big diagram of all your mistakes, so you can see when things don't line up—sorta like a virtual flight sim for perfecting aerobatics!

Installing and using a smoke-pump system is not at all difficult. Go ahead; start smoking, and enjoy yourself. But remember: always look at your model and not at the smoke trail! ✈

MDW Aviation Associates (708) 599-9999; mdw-aviation.com.





Advanced thermal glider. The Falcon 880 is the thermal-duration, precision-landing soarer that started the 6-servo trend that is widespread today. It has 4 servos in the wing (2 for ailerons and 2 for flaps) and 2 servos in the fuselage (elevator and rudder).

harness the power of the wind

all about RC  by Dave Garwood

SOARING!

Below: slope launch. The ground crew throw Dave Nash's $\frac{1}{4}$ -scale P-51 Mustang slope sailplane off the hill and into slope lift during Soar Utah 2000 (photo by Joe Chovan).



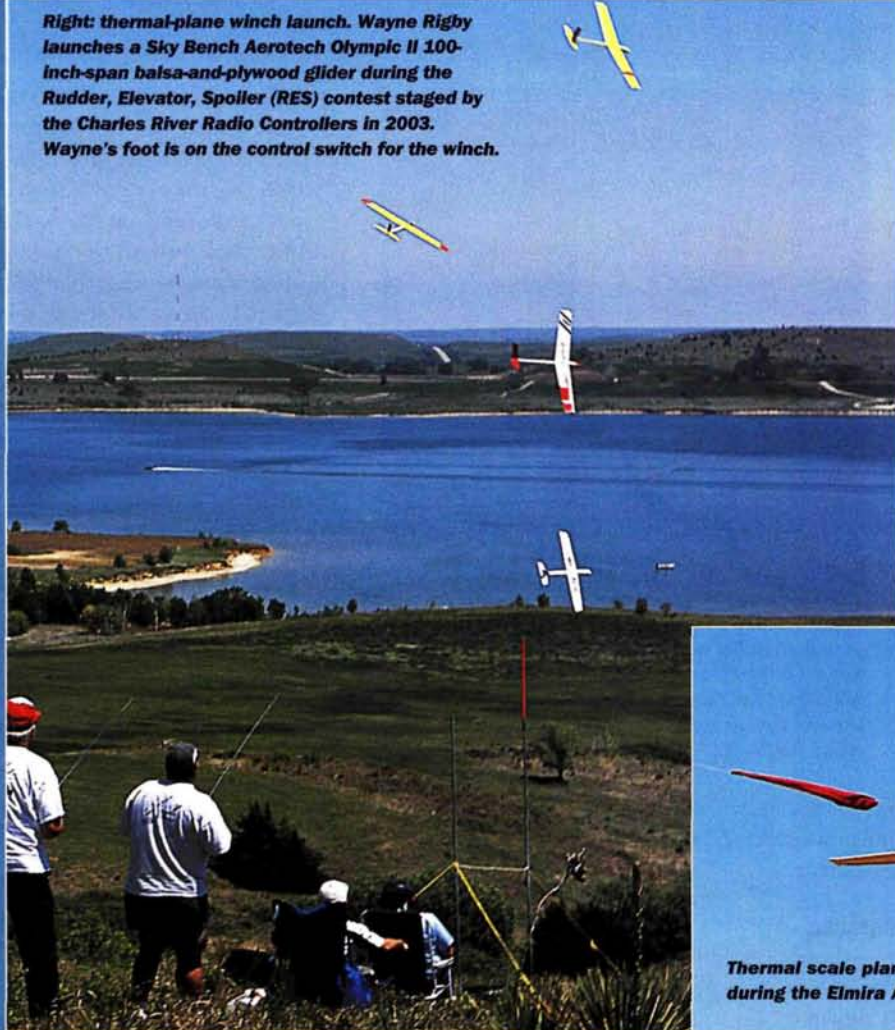
Left: slope launch. This is how a slope plane is launched: just throw the model out into the lift (photo taken during Foamie Combat match at Midwest Slope Challenge 2001).



Right slope jet. Larry Blevins' Magnum Models F-5 Tigershark EPP-foam slope jet during the Midwest Slope Challenge 2003.



Right: thermal-plane winch launch. Wayne Rigby launches a Sky Bench Aerotech Olympic II 100-inch-span balsa-and-plywood glider during the Rudder, Elevator, Spoiler (RES) contest staged by the Charles River Radio Controllers in 2003. Wayne's foot is on the control switch for the winch.



Thermal scale plane. Dan Troxell's Fox on an aerotow launch during the Elmira Aerotow 1999.

SOARING TRIVIA

Q What's the fastest model airplane in the world?

A A slope glider called the "Arrow" holds the FAI record of 242.9mph and was flown to this speed by Austrians Werner Sitar and Fritz Fridolin on June 18, 1977. Turbine-powered jet models are approaching this speed but, as of this writing, after 26 years, the official world record for the world's fastest model airplane is still held by a sailplane.

Q How far has anyone flown an RC model sailplane?

A 140 miles. While we have just had an RC model cross the Atlantic Ocean, on May 2, 1988, Joe Wurts flew a glider 140.67 miles under continuous RC control by the pilot to achieve the current AMA RC soaring distance record.

Q How long can an RC model sailplane fly?

A Rex Coffman holds the AMA RC soaring slope duration record for a 13-hour, 32-minute flight on April 21, 2001. Keith Kendrick holds the AMA RC soaring thermal duration record for a 9-hour, 47-minute flight on May 30, 1982. A list of 110 RC pilots who have flown a sailplane for more than 2 hours in thermal lift and for more than 8 hours in slope lift as part of the League of Silent Flight individual achievement program appears on the LSF website at silentflight.org.

There are RC pilots who think of gliders as nothing more than slow-flying, unimpressive model aircraft to be used mainly for trainers and to entertain old men whose flying skills are not up to flying high-powered aircraft. These fellows are uninformed. While gliders do serve well as trainers and as slow, easy-to-see planes for those whose eyeballs and reflexes have seen better days, there is more to gliders—much more. RC sailplanes are an ultra-exciting component of RC flying, and some can do things that powered planes cannot.

Model sailplanes can be 2-channel (rudder and elevator) slow flyers, aerobats and speed demons, and some are 6-servo, all-out-competition machines (ailerons, flaps, elevator, rudder). They can be flown in thermal lift and slope lift, and they can be engaging enough to fill an RC flier's career.

This article is aimed at RC pilots who may be interested in soaring but perhaps haven't tried it yet, and it covers the two main branches of RC soaring: thermal and slope. I'll talk about both kinds of soaring and mention representative sailplanes, but first a few words on lift.

When they're flying, sailplanes are descending relative to the parcel of air they are in. Gravity gives us the power to fly an unpowered model, as the downward pull is converted into forward speed by the sailplane's wing. For us to keep a sailplane in flight for a significant time, we must find lift, or rising air, and fly it in that lift. We have two main sources of lift: thermal lift and slope lift.

- **Thermal lift is generated by the sun's heating the ground unevenly;** the warmer ground heats air that expands and rises. This rising air creates the lift in which we see hawks, eagles and vultures circling upward with wings outstretched.

- **Slope lift is generated when wind blows into the face of a hill or ridge and is forced upward.** When we see gulls cruising by, flying without flapping, they are flying in slope lift.

THEMAL SOARING

The song that plays in the back of my head while I'm thermal soaring is The Eagles' "Peaceful Easy Feeling." Few activities are as relaxing and intriguing as cruising around the sky searching for thermals and then bringing the plane down when you're good and ready. You can fly thermals by yourself, with a couple of buddies, or in an organized contest.

Thermal sailplanes cost between \$50 and

\$1,000 and use radio systems that start at \$79 and go up to \$500. The most popular starter thermal sailplane is a 2-meter-wingspan sailplane (78 inches) built of balsa and plywood or purchased in an ARF package. Polyhedral (curved-wing) sailplanes are controlled by two servos that drive the rudder and elevator. They are inherently stable and tend to right themselves when you make control mistakes. They are also inclined to fly themselves with little input from their pilots. These sailplanes are large enough to fly well while carrying two inexpensive servos of standard size.

The classic beginner polyhedral trainer is the Carl Goldberg Products Gentle Lady; it has been in production for more than 20 years because of its clear building instructions and solid flight performance. Others in this class are the Great Planes Spirit and the Sig Riser. You can find many suitable beginner, intermediate and advanced sailplanes on the websites listed in the "Soaring Resources" sidebar.

LAUNCHING TECHNIQUES

How do you get a model that doesn't have a motor into the air? We have five methods: hand-launch, rubber high-start, bungee launch, winch and aerotow by a powered model airplane.

- **Hand-launch is just what the term suggests.** The pilot throws the sailplane and immediately begins the search for lift. Today's hand-launch gliders (HLGs) are "discus launched" by one wingtip, and with practice, an average pilot can easily achieve a launch height of 60 feet or more. Dig out your copy of the January 2003 issue of *Model Airplane News* for an article on flying these amazing planes.

- **High-start.** Most commonly used by newcomers, a high-start consists of a ground stake, 30 to 100 feet of rubber tubing and 100 to 400 feet of towline that ends with a parachute that has a tow ring on the top. High-starts come in several strengths and sizes and are rated for the wingspan of the sailplanes they're designed to launch. Generally, the larger the plane, the longer the rubber tubing and the towline.

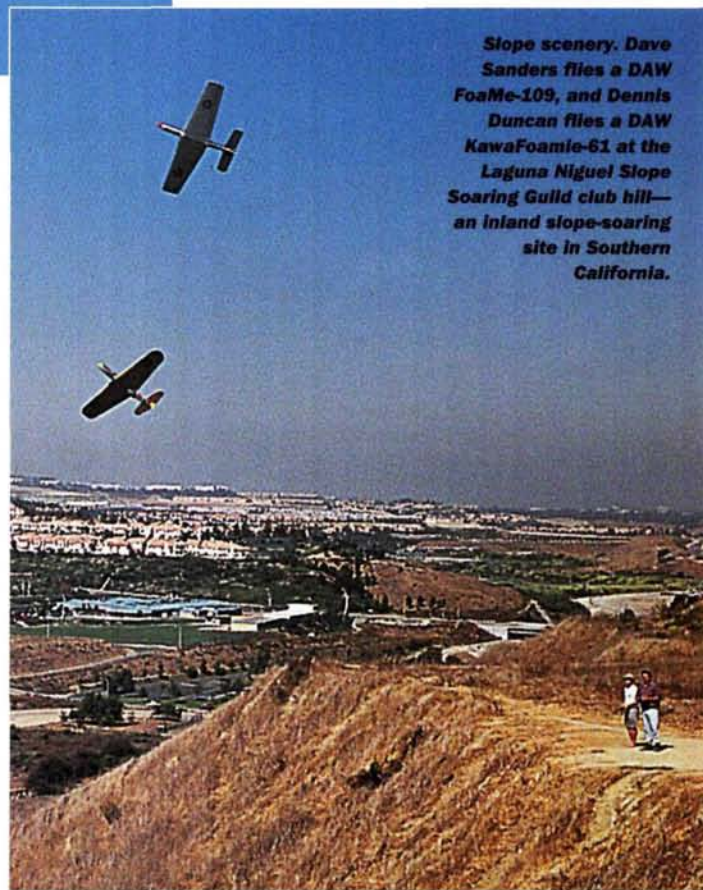
To launch with a high-start, turn on your transmitter and receiver, slide the tow ring onto the sailplane's towhook and walk downwind from the stake to stretch the rubber. With a last wiggle of the sticks and a check that the control surfaces are moving, throw the sailplane upward at a 45-degree angle. It will rise quickly, tracing a curved path

upward in the direction of the stake. When it flies over the stake, the tow ring will slip off the towhook automatically, unless the wind is strong, in which case the plane will stretch the rubber tubing and tend to stay on the towline. To release it, push the stick forward to dip the nose, and then pull up, and the tow ring will slip off the towhook.

High-starts are staked at the upwind side of the field, and the plane is launched into the wind. The stronger the wind, the higher the launch. You throw the sailplane when you launch it to get it up to flying speed as quickly as possible so that you'll have control as soon as is possible. Follow the manufacturer's recommendation with respect to



Slope combat. Foamie combat planes flown by two of the sport's originators: Dave Sanders' DAW Foamie-109 attacks Dennis Duncan's DAW Kawa Foamie-61.



Slope scenery. Dave Sanders flies a DAW Foamie-109, and Dennis Duncan flies a DAW Kawa Foamie-61 at the Laguna Niguel Slope Soaring Guild club hill—an inland slope-soaring site in Southern California.

how far to pull back before you let your sailplane go.

The sailplane's path while on tow does not start with horizontal acceleration that turns into a sharp climb (as you might guess if you haven't seen a high-start launch). On being launched, the sailplane acts much more like a kite than like a slingshot projectile, and it can achieve a launch height of 100 to 400 feet, depending on the length of the high-start's tubing.

- **Bungee.** This is just the rubber tubing part of a high start—no string or parachute. This is for tougher planes and more experienced pilots because the model will act like a slingshot projectile, and things happen pretty fast. A bungee will quickly catapult your plane to 100 to 300 feet, most of that gained by the model's rocketing skyward when it leaves the bungee.

- **Winch.** Using a winch is the most common way to launch big sailplanes, i.e., those with 120-inch wingspans and longer. The winch is an automotive starter motor with a reel attached. The line runs out



Slope scenery. When it's too windy to fly power or thermal, head for the slope. Lou Garwood and Terry Dwyer fly over Cape Cod Bay. Note the whitecaps on the water, and Terry wears ski goggles.

to a turnaround pulley about 300 feet away and then back to the pilot, where it's hooked to the sailplane's towhook. The winch motor is energized with a foot switch, and the line is reeled in and pulls the sailplane forward while its wings create lift and the model reaches 200 to 400 feet (or more!).

- **Aerotow.** A cooperative effort between a powered model pilot and a sailplane pilot, an aerotow pretty much re-creates, in miniature, the way full-size sailplanes are commonly launched: by being hauled up on a line by a towplane. The best way to learn how to do this is to go to an event put on by a soaring club that promotes aerotowing.

Some of my happiest days in RC flying were at the thermal field. The rest of my happiest days in RC flying were at the slope.

SLOPE SOARING

The songs that I can't get out of my head while slope soaring are Kenny Loggins' "Danger Zone" and, sometimes, the Meat Loaf song "Bat out of Hell." Sure, in light slope lift, you can fly HLGs and beginner polyhedrals, but it doesn't get really exciting until you begin to fly dedicated high-performance slope sailplanes. In addition to just cruising around the sky in seemingly endless lift, slope pilots also fly aerobatics, race and fly full contact combat. It comes as a surprise to some that slope gliders can fly nearly all the maneuvers that powered aerobatic models can fly (the exception is unlimited vertical climb). Aerobatic slope sailplanes can easily fly loops, rolls, spins, unlimited inverted, Cuban-8s and split-S's and, in the hands of expert pilots, rolling circles.

Slope glider kits cost from \$50 to \$200 and almost always use \$100 to \$200 radio systems. The majority of slope planes use only 2 channels (rudder and elevator, aileron and elevator, or 2 channels mixed as elevons). The most frequent starter slope sailplane these days is a flying wing made of crash-resistant EPP foam. Well-known examples are the Cavazos Boomerang, the Trick R/C Zagi and the Windrider Aviation EPP Bee; many others are available at kit prices ranging from \$50 to \$70. In addition to being good trainers, the self-recovery aerodynamics of these gliders makes them prime candidates for slope combat, during which pilots intentionally nail other planes in the air, but planes are rarely damaged because of the resiliency of the EPP foam construction material.

Another group of exciting slope gliders are the 48-inch-span warbirds. Also made of EPP foam and also for slope combat, these look better in the air and more like airplanes. Foamie warbird kits cost around \$75 to \$85 and are made by Dave's Aircraft Works, Leading Edge Gliders, Magnum Models, Patton Aircraft and others.

Next are the racers. Somehow, racing is in our blood, and racing slope planes comes naturally. The 60-inch-span One Design Racing (ODR) class established by the Torrey Pines Gulls Club in San Diego, CA, is designed to keep the cost of the airframe low and still provide the performance demanded by speed freaks. You'll see a lot of ODR racing at Midwest Slope Challenge events staged by the Lincoln Area Soaring Society (Nebraska). Emerging in 2003 is a new 60-inch-warbird racing class formulated by the Inland Slope Rebels of Riverside, CA. The slope-racing sailplanes traditionally had molded-fiberglass fuselages and balsa-sheeted foam wings, but increasingly, they are being designed and built of EPP foam. Suppliers of slope-race planes include Leading Edge Gliders, Mike's Models (MidwestSlope.com), ShredAir, Soaring Specialties, Polecat Aeroworks and others.

A large contingent of slope pilots fly scale sailplanes. These kits can be made of fiberglass or foam and can contain two servos all the way up to full-house six-servo setups and beyond. Designers, makers and suppliers include Dave's Aircraft Works, Dymond Model Sports, Endless



Above: a slope PSS sailplane. Joe Chovan's own-design Me-109 made of EPP foam for the Foamie Warbird Racing class at the Midwest Slope Challenge, 2003.

Below: Dave Sanders and Joe Chovan fly aerobatics in slope lift. In the background is Wilson Lake in Russell County, KS.



Mountain Models, Falcon Air RC, Hobby Lobby Intl., Northeast Sailplane Products, Sailplanes Unlimited, ShredAir and others. The Birdworks makes an RC gull kit, and the gull is our slope-flying hero.

A subset of scale slope planes—power slope scale (PSS) sailplanes—is my favorite category: models of WW II fighters, bombers, jets and rocket planes. They fly superbly if you can get to a slope with good lift, and they look wonderful, if you don't mind taking a little more time to finish and detail them. You can see many PSS planes in the coverage of the Inland Slope Rebels Southern California Power Slope Scale Festival in the *Model Airplane News* October 2003, November 2002 and October 2001 issues. While PSS planes are often original designs, PSS kit makers not already mentioned in the section on foamie warbirds include Slope Scale, now made by Composite Systems Development, and Vortech Models.

FLYING IN SLOPE LIFT

We've covered slope sailplanes; now on to flying in slope lift. For a suitable hill, consult the websites listed in the "Soaring Resources" sidebar, or look around your own stomping grounds. We have flown from coastal dunes, small hills and large mountains, gravel pits and trash dumps. It's generally easier to learn to fly slope on a known good soaring hill and then to take your new-found flying skill to a local hill.

For starters, you need wind—8mph or faster—blowing straight, or almost straight, into a hillside. Adequate lift depends not only on wind speed and slope shape but also on wind direction. The more directly the wind blows into the slope, the stronger the lift. You can fly in a slight crosswind, maybe up to 20 degrees either way, but lift is reduced and more skill is required.

The lighter the model, the weaker the lift it needs to sustain flight. It's a rare day when there's too much wind because when the wind increases, we fly smaller, heavier and faster models. If you can stand up in it, you can fly in it. The best way to determine whether there's enough lift to fly is to watch other sailplanes; second best is to watch gulls or hawks soaring at the slope. If no other fliers, human or bird, are working the slope, test the lift by firmly holding the model out in front of the slope in the lift. If it wants to rise out of your hand, there's probably enough lift to fly.

When you're ready to launch, step confidently to the overlook, and give the model a firm toss in a slightly downward direction—yes, downward, because at this point, you'll need airspeed more than altitude. The model may balloon upward suddenly, so be prepared to quickly push the elevator stick forward to prevent it from stalling. If the lift is sufficient, the model will soon be back above the hill, but if you don't have enough airspeed for solid control, it will crash. After a few seconds to build up speed, turn 90 degrees so that the plane is flying parallel to the slope. It will continue to gain altitude and will be flying above and out in front of the hill. Before it gets too small to see, make a 180-degree turn away from the hill and pass in front of the launch position. At the other end of the circuit, make another 180-degree turn, again turning away from the hill. You're now flying a basic slope-soaring pattern. Seen from above, it's a figure-8, always turning into the wind. We turn into the wind to keep the airspeed up and the ground speed down in the turns and to avoid being blown back over the hill, which is just about the worst thing that can happen because behind the hill, lift

decreases rapidly and turbulence increases sharply.

Once you've launched and established a flight pattern, you may want to explore the limits of the lift zone. Generally, lift is strongest just above and slightly out in front of the overlook. Lift tapers off as the plane goes higher and decreases as it goes farther out. Usable lift can range from a few feet up to three times the height of the hill and from the overlook to 200 feet or more out in front. Finding the limit of the lift zone out in front of

Dave Garwood flies a Torque and Recoil Club Foamer on slope wing over a valley in the Berkshire Mountains in western Massachusetts (photo by Dave Sanders).



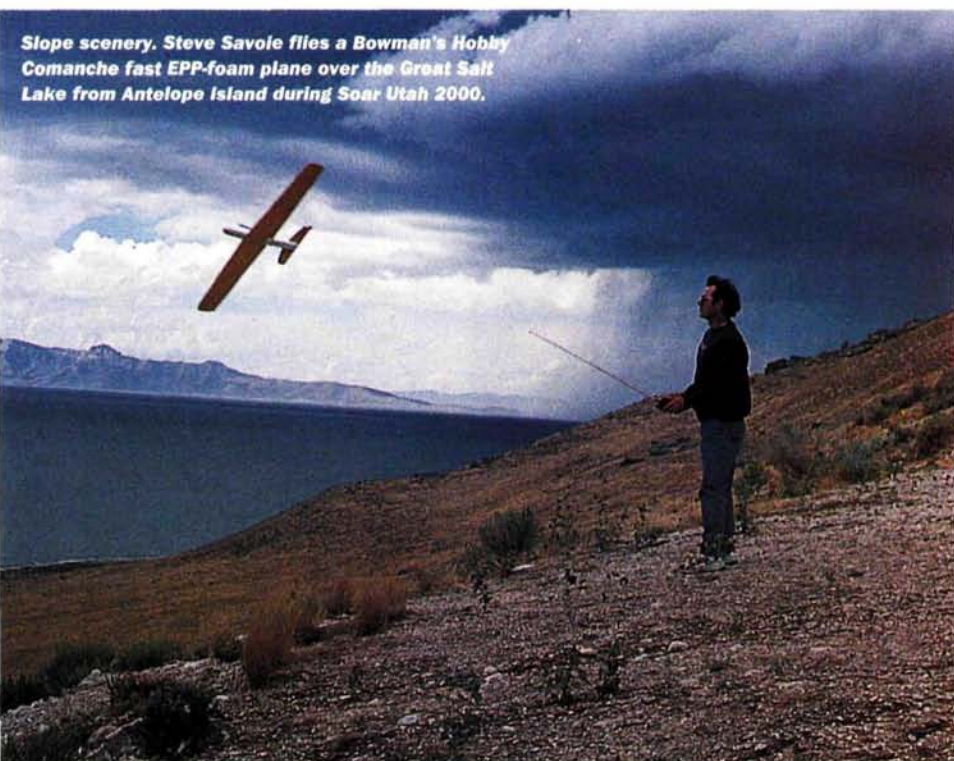
Left: slope racing. Action at the near turn during the ODR-class race during the Midwest Slope Challenge, 2003. This is a low-cost racing category, and four racers fly in each heat.

the hill is not difficult because it tapers off gradually. Just fly out until your model gently begins to settle, and then bring it back into stronger lift to keep it aloft. Flying behind the hill is hazardous, so take pains to stay out in front. We gain altitude by flying in the strongest part of the lift. In strong lift, you can get up to twice the height of the hill in two or three passes. In weaker lift, it may take many passes, gaining a few feet with each one, to get to a happy cruising altitude. We reduce altitude mainly by intentionally flying into areas of weaker lift.

ADVANCED TECHNIQUES

What do you do once you've got the basics? Aerobatics! Almost anything that can be done with a powered model can be done with a slope model. Those with long-wing thermal-glider experience may try loops first. Former powered-model pilots may prefer rolls as their first departure from straight and level. For either maneuver, gain some altitude, enter a shallow dive to build up speed, and then perform the maneuver. Inverted passes are cool, and flying the whole figure-8 pattern inverted is super-cool. Immelmann turns, split-S's and Cuban-8s are well within the performance envelope of fast aileron and elevator slope ships.

Slope scenery. Steve Savole flies a Bowman's Hobby Comanche fast EPP-foam plane over the Great Salt Lake from Antelope Island during Soar Utah 2000.



To start soaring, check with your local hobby shop for available sailplanes, for recommendations on flying sites and for information on nearby soaring clubs. An online search will reveal hundreds of pages of resource information about both thermal and slope soaring. Attending a contest or another soaring event will allow you to meet many soaring pilots and let you see dozens of sailplanes. Joining the Academy of Model Aeronautics will give you liability insurance, a subscription to *Model Aviation* magazine, which lists upcoming contests and events, and access to a database of many hundreds of modeling articles. Yes, it's possible to teach yourself to fly sailplanes, but the learning goes a lot faster with the help of an experienced flier—maybe one who can be connected to your transmitter with a trainer cable or “buddy box” configuration for some hands-on flight instruction. We here at *Model Airplane News* hope you do get started in RC soaring, and maybe we'll meet up someday on the a slope or at a thermal field. ✚

SOARING RESOURCES

Here's the contact information you need for the manufacturers mentioned in this article, for suppliers and for jumping-off places where you can learn more about soaring.

CLUBS, EVENTS & INFORMATION

Academy of Model Aeronautics. Pilot insurance, magazine articles online, listings, links to AMA club websites; (800) 435-9262; modelaircraft.org.

American Slope Racing Organization. Slope racing schedules, results, sites; sloperacing.com.

Charles River Radio Controllers. Beginner articles, links to website resources; charlesriverrc.org.

Eastern Iowa Soaring Society. Extensive links to soaring website resources; eiss.cnde.iastate.edu/links.shtml.

Fatlion Sailplanes. Excellent beginner articles, glossary, kit reviews, links; fatlion.com/sailplanes/sailplanes.html.

Gold Country R/C Soaring. Soaring sites in California and Nevada; ncws.com/rcrock.

Laguna Niguel Slope Soaring Guild. California slope soaring club; rcsoaring.com/lssg.htm.

La Sierra Slope Soarers. Beginner articles, brief reviews of 54 sailplanes; lss.homestead.com.

League of Silent Flight. Beginner articles, LSF achievement program; silentflight.org.

Midwest Slope Challenge; Lincoln Area Soaring Society event; home.alltel.net/mwsc.

Radio Control Soaring Exchange (RCSE). Internet email group—a good place to ask questions; eclipse.net/~mikel/tcse/intro.htm.

R/C Soaring.Com. Resources, index links to many other sites; rcsoaring.com.

Slopeflyer.Com. Slope site listings; *Slope Trash* magazine.

Southern California PSS Festival. Inland Slope Rebels; ourworld.compuserve.com/homepages/ISR.

Soar Utah event. InterMountain Silent Flyers; silentflyer.org.

Soaring FAQ (Frequently Asked Questions). Answers to beginner and advanced questions; kohlin.com/air/soar-faq.htm.

South Bay Soaring Society. Beginner articles, links to website resources; sbss.org.

Torrey Pines Gulls. Slope, thermal and HLG event information, resources; torreypinesgulls.org.

MANUFACTURERS

The Birdworks. Unusual slope sailplanes, including the scale RC gull; (503) 332-0194; harborside.com/~birdworks/bwhome.htm.

Bowman's Hobbies. High-performance EPP foam slope sailplanes; (888) 296-1881; bowmanshobbies.com.

California Sailplanes. EPP foam slope jets; californiasailplanes.com.

Carl Goldberg Products. Gentle Lady 2-meter trainer kit; (678) 450-0085; carlgoldbergproducts.com.

Composite Systems Development. Slope Scale fiberglass PSS warbird slope gliders; rcglider.com.

Dave's Aircraft Works. EPP foam slope combat warbirds and EPP scale sailplanes; (949) 248-2773; davesaircraftworks.com.

Dymond Model Sports USA. A large number of imported sailplanes; (888) 4FUN FLY; rc-dymond.com.

Dynaflite; distributed by Great Planes. Bird of Time, other glider kits; (217) 398-6300; (800) 682-8948; dynaflite.com.

Endless Mountain Models. Imported fiberglass scale thermal planes, Pegasus tow plane, Elmira Aerotow announcements; scalesoaring.net.

Falcon Air RC. EPP foam scale glider kits; (970) 726-7126; falconairrc.com.

Frank Cavazos Model Aircraft. Boomerang flying wing; (909) 485-0674; boomerangwings.com.

Great Planes Model Distributors. Spirit, Spirit Elite, Spirit 100 sailplane kits; (217) 398-6300; (800) 682-8948; greatplanes.com.

Hobby Lobby Intl. Many imported sailplanes; (615) 373-1444; hobby-lobby.com.

Leading Edge Gliders. Hellcat, Mustang, Patriot, Me-109 EPP foam slope gliders; leadingedgegliders.com.

Magnum Models. Cobra Racer, EPP foam warbirds and slope jets; magnum-models.com.

MidwestSlope.com. Mike's Models kits, racing information.

Mountain Toys RC Gliders. EPP foam warbirds, bombers, scale planes; (208) 887-6399; mntntoys.com.

Northeast Sailplane Products. Sailplanes, Pinnacle High Starts, articles; (802) 655-7700; nesail.com.

Patton Aircraft. Fast EPP slope warbirds; home.earthlink.net/~pattonaact.

Polecat Aero Works. Discus launch HLGs, Hammerhead fiberglass ODR racer; polecataero.com.

Sailplanes Unlimited. Imported fiberglass scale thermal sailplanes, Elmira Aerotow history; (212) 879-1634; sailplanes.com.

ShredAir. Imported fiberglass high performance sailplanes; (212) 879-1634; shredair.com.

Sig Mfg. Riser 2-meter and Riser 100 sailplane kits; (800) 247-5008; sigmfg.com.

Sky Bench Aerotech. Historical balsa thermal glider kits; skybench.com.

Slope Scale. Fiberglass PSS warbird and slope jet kits; (909) 485-0674; ourworld.compuserve.com/homepages/slope_scale.

Soaring Specialties. Slope sailplane kits and accessories; (405) 692-1222; soaringspecialties.com.

Soaring Stuff. Sailplane accessories; (505) 898-8281; soaringstuff.com.

Tower Hobbies. Large supplier, extensive RC website links, including soaring. (800) 637-4989; towerhobbies.com/rcwsail.html.

Trick R/C. Zagi, one of the best-known combat flying wings; (310) 301-1614; zagi.com.

Vortech Models. Fiberglass PSS warbird and slope jet kits; (626) 458-5578; geocities.com/vortechmodels.

Windrider Aviation EPP Bee, a combat flying wing kit that can be built in three hours; windrider.com.hk.



GREAT PLANES

U-CAN-DO

The easy way to



by Erick Royer

3D .46

master 3D flight!

It seems as if you can't open a magazine, go to an online discussion group or even go to your flying field without someone talking about 3D flight. Why is it so intriguing? Maybe because even full-size airplanes can't do it! Although 3D maneuvers can require a lot of practice, they are very cool to perform and even cooler to watch. Your first step is to get a 3D-capable model, but don't worry about spending a fortune; the engineers at Great Planes have come up with a new 3D-capable sport flyer: the U-Can-Do 3D .46 that costs less than \$200! Having heard so many good things about the .46's big brother, the U-Can-Do 3D .60, I was very excited to see how well this .46-size plane would perform.



The model comes with everything you'll need to get it flight-ready, less glue, radio gear and engine.

KIT CONTENTS

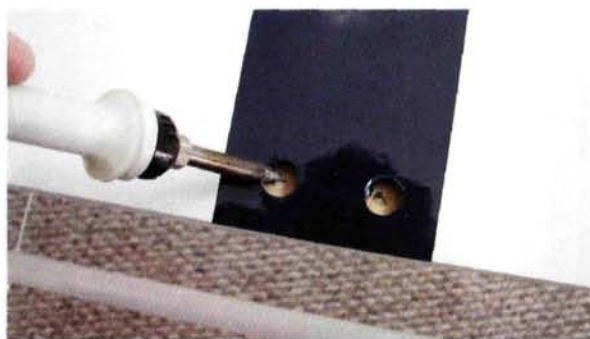
The fuselage and wing are constructed of balsa and lite-ply, and the extra-large tail and control surfaces are high-grade balsa. The fiberglass cowl and wheel pants are painted to match the MonoKote covering. The hardware pack includes the fuel tank, engine mount, landing gear, wheels, control horns and even a spinner. The included manual is so thorough that even a newcomer could assemble this model.

Before I began to assemble the model, I took a few minutes to iron out some of the minor wrinkles in the covering on the fuselage and wing.

WING ASSEMBLY

I used my soldering pencil to open the holes for the wing hold-down bolts, servo openings, servo wires and the leading-edge dowel. I like this method because it seals the covering as it makes the hole. Next, I installed the leading-edge dowel on the front of the wing with some 5-minute epoxy.

I opened all the hinge slots with a sharp hobby knife. The kit comes with a single sheet of CA hinge material that you need to cut into 3/4x1-inch pieces, but I prefer to use Sig Easy Hinges; they come already cut. Next, I test-fit the ailerons, marked the center point of each hinge slot and drilled a 3/32-inch hole in the



I easily made the holes in the wing for the aileron leads with a hot soldering pencil; it quickly melts the covering and seals the edges at the same time.

center of each slot. This helps the CA get to the back of the hinge and provides a stronger bond. I attached the ailerons with several drops of thin CA on each side of the hinges. I left a 1mm gap in the hinge line and sealed it with tape.

**The U-Can-Do .46 is
an extremely
impressive model...
big-plane performance
without spending
big-plane dollars,**

I installed Futaba S3004 servos in each wing opening for the ailerons. You'll need a 12-inch extension for each. You could connect both servos to a Y-harness and then into your aileron channel, but I chose to use channels 1 and 6 and mix them using my Futaba 9CAP, so I can mix in flaperons if I want to. At this point, I installed the control horns on each aileron and connected them to the 2-56 pushrods. Each pushrod uses a plastic clevis on the aileron and an L-bend with a keeper on the servo. Be sure to install a piece of tubing on each connector to prevent it from becoming loose during flight.

SPECIFICATIONS

MODEL: U-Can-Do 3D .46

MANUFACTURER: Great Planes Model Mfg. Co.

TYPE: fun-fly

WINGSPAN: 56.75 in.

WING AREA: 904 sq. in.

WEIGHT: 5 lb., 4 oz.

WING LOADING: 13.8 oz./sq. ft.

ENGINE REQ'D: .32 to .50 2-stroke or .52 to .72 4-stroke

ENGINE USED: O.S. .50SX 2-stroke

RADIO REQ'D: 4-channel with six servos (rudder, throttle, ailerons, elevator)

RADIO USED: Futaba 9CAP, Futaba S3004 servos (elevators and ailerons), Hobbico CS-67 servo (throttle) and CS-65 servo (rudder)

PROP: APC 13x4W

FUEL: Wildcat 15%

PRICE: \$169

FEATURES: built-up fuselage and wing; MonoKote covering; fiberglass cowl and wheel pants; Great Planes hardware includes a fuel tank, engine mount, landing gear and wheels, control horns and spinner; large control surfaces are beveled for maximum throw.

COMMENTS: the U-Can-Do .46 has excellent 3D flight performance, and its vibrant covering scheme is easy to see in the air. It's also easy to build; you can complete it in about 8 hours.

HITS

- Fast, easy assembly and great manual.
- High-quality hardware included.
- Easy to hover and perform 3D aerobatics.

MISSES

- None.

For the last step, I attached the wing to the fuselage and lined up the belly pan. I traced an outline of it on the bottom of the wing and removed a 1/4-inch-wide piece of covering just inside the lines, and I attached the belly pan with 5-minute epoxy.

TAIL INSTALLATION

Before I installed the tail surfaces, I used my soldering pencil to remove the covering from the slots in the fuselage. To make sure that the horizontal stabilizer was level with the wing, I attached the wing to the fuselage and slid the stabilizer into the slot. I sighted

the wing from the rear of the plane and was happy to see that it was perfect.

I aligned the stabilizer, marked the fuselage outline on the stab and removed the covering from that area. I added some small perforations to the bare wood with my Great Planes Woodpecker and secured it into place with 5-minute epoxy. I attached the vertical fin the same way.

Before I could attach the rudder, I drilled a hole and made a groove for the tailwheel wire. I temporarily mounted the tailwheel assembly and rudder onto the fin (so I could mark the position of the wire), and I drilled a $\frac{5}{32}$ -inch hole in the rudder's leading edge. Then, with a piece of $\frac{5}{32}$ -inch brass tube, I routed a groove from the hole to the bottom of the rudder to hold the tailwheel wire. After I was satisfied with the fit, I permanently attached the rudder with Sig Easy Hinges and thin CA.

I installed the elevator halves the same way as I did the ailerons; I used Sig Easy Hinges and drilled a $\frac{3}{32}$ -inch hole in the center of each hinge slot. I was careful to make sure that these control surfaces were well secured to handle the potentially high-stress load that they might see in flight.

The U-Can-Do 3D .46 features tail-mounted servos for the elevator and rudder that provide the shortest possible linkages and make setup a breeze. After I removed the covering for each opening, I installed two Futaba S3004 servos for the elevator halves and a Hobbico CS-65 high-torque servo for the rudder. I needed a 24-inch extension for each servo. When I installed the control horns on each elevator half and the rudder, I made sure that the pushrod holes were directly over the hinge line. I wasn't sure how long a servo arm I needed to obtain the required 3D throws. I initially decided to use the long arms that came with the servos; they provide about 30 degrees of surface deflection, but I might upgrade to Du-Bro heavy-duty servo arms, as they are about $\frac{1}{2}$ inch longer. I connected the pushrods to the servo arms with the included 2-56 pushrods, but I was a little apprehensive about using them on the tail section because of the possible high-stress loads. I found out later that they were perfect for the job.

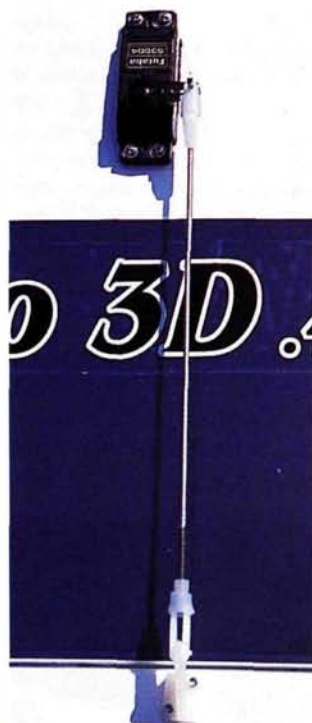
LANDING GEAR AND WHEEL PANTS

Before I mounted the wheel pants onto the landing gear, I installed the plywood pant mounts inside each pant with 5-minute epoxy. Next, I mounted the axles to the landing gear and attached the gear to the fuselage with two hex bolts and lock washers. (The blind nuts were installed at the factory.) I attached the wheel pants, wheels and wheel collars to each axle and set the plane

on its feet. I made sure that both wheel pants were even, and then I drilled two small holes from the back of the landing gear into each wheel pant to prevent the wheel pants from rotating.

ENGINE INSTALLATION

I drew vertical and horizontal lines on the firewall (using the embossed lines as a guide) and installed the engine mount with the four 6-32 bolts, washers and lock washers, but I



didn't tighten them. I adjusted the width of the mount to match the engine while I confirmed that the tick marks on the mount were centered on the vertical line. Next, I placed my O.S. .50SX inverted on the mount and measured 5 inches from the firewall to the back of the spinner plate; I used my Great Planes Dead Center Locator to mark where I would drill the four mounting holes and installed the engine with the supplied bolts and locknuts.

I installed the throttle servo and fuel tank next. I glued the servo tray into place inside the fuselage and installed a Hobbico CS-67 servo, and then



On the vertical fin, I perforated the surfaces to be glued with a Top Flite Woodpecker, so they would bond better.



Left: each aileron is controlled by a single servo. The Great Planes hardware works very well. Above: installation of an O.S. .50SX is straightforward, and I chose a 2½-inch-diameter Tru-Turn spinner to finish off the front end of my model. The extra-wide prop cutout accommodates the wide-blade APC prop that I use.

I marked the firewall where I later drilled a hole for the pushrod tube to exit. I slid the pushrod through the tube and attached it to the throttle arm on the carburetor with a plastic clevis. I installed the other end of the pushrod on the servo arm with a Du-Bro EZ screw-lock connector.

I assembled the fuel tank and slid it into the nose of the fuselage. I packed foam around it and secured it with a balsa brace that I glued just behind the tank. I like to use three lines in my fuel tanks: supply, fill/drain and vent. I connected the supply line to the carburetor and connected the vent and fill/drain lines after I attached the cowl.

I attached the cowl-mounting blocks to the firewall with 5-minute epoxy. When they were dry, I taped some paper to the sides of the fuselage and marked the position of the various holes that I needed to cut into the cowl. I then transferred these marks to the cowl and cut out the holes with a Dremel tool and a cone-shaped grinding wheel.

I mounted the cowl on the fuselage and attached the muffler. The vent line was attached to the muffler, and I installed an R/C City fuel dot for the fill/drain line.

TAKEOFF AND LANDING

The U-Can-Do 3D .46 tracks very well when you hold up-elevator. The tail-wheel and a large rudder make turning it a breeze. If you point the plane down the runway and advance the throttle while you hold a little right rudder, the plane will be airborne before you reach $\frac{1}{2}$ throttle. If you want the plane to take off like a fun-fly, advance the throttle to full and pull the elevator back; in about 10 feet, the plane will climb like a rocket—straight up.

When it lands, the U-Can-Do .46 is a real floater; it seems to take forever to settle down for a landing. There are no tricks required to land this plane.

LOW-SPEED FLIGHT

With power just a few clicks above idle, the U-Can-Do floats around like a Piper Cub. If you want a plane for relaxing flights, set your transmitter to low rates and have a ball! The plane won't stall if you keep a few clicks of power on and use low rates.

HIGH-SPEED FLIGHT

I don't believe that the engineers at Great Planes had high-speed flight in mind when they designed this aircraft. With the O.S. .50SX



and 13x4W prop, it is set up for more thrust than speed. The U-Can-Do does move at a good clip, but it certainly isn't a speed demon.

AEROBATICS

The U-Can-Do performs loops, rolls, figure-8s and knife-edges very well and with authority. Snap rolls don't have the snap that you would expect from an Extra or CAP, but this is a 3D plane; why waste time with pattern maneuvers?

In a hover, the U-Can-Do needs a little more than $\frac{1}{2}$ throttle to maintain altitude; it remains rock-steady throughout the maneuver. In fact, I didn't even need 3D rates to maintain the hover! When it started to fall out, I went to full power, and it climbed out of the hover.

On 3D rates with 50-percent deflection, the U-Can-Do's nose will stay 45 degrees from the ground with no roll or pitch coupling during knife-edge flight. Full deflection will allow knife-edge loops all day long. The U-Can-Do's ability to perform a harrier is impressive; simply fly to a stall and slowly apply full up-elevator while you adjust the throttle for nose-high level flight—awesome!

The O.S. .50SX and APC 13x4W propeller are an excellent combination for this aircraft. I would have preferred a bit more power to pull out of a hover (an O.S. .72 4-stroke should do the trick). Nevertheless, this combo gives you the tools that you need to sharpen your 3D flying skills!

I used an APC 13x4W 3D Fun Fly prop. I carefully balanced the prop and attached it with the $2\frac{3}{4}$ -inch Tru-Turn spinner.

FINAL DETAILS

Only the receiver, battery and canopy were left; I cut the canopy from its mold and attached it

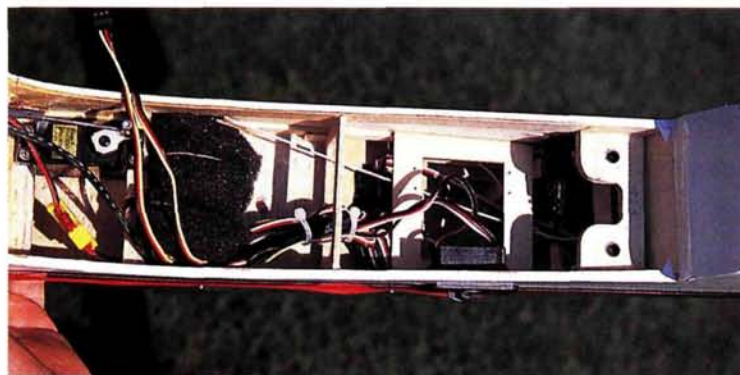
control throws. After setting up the directions and centering, I programmed in the dual rates according to the instructions. I noticed that I could still get some more surface throw, so I moved the rates to a three-position switch and set up low, high and 3D rates (maximum deflection). I set up exponential on all rates

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.

Du-Bro Products (800) 848-9411; dubro.com.

Futaba Corp. of America; distributed by Great Planes Model Distributors; futaba-rc.com.

Great Planes Model Mfg.; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; greatplanes.com.



Only the throttle servo is in the fuselage with the receiver and its battery.

to the fuselage with four self-tapping screws. (Don't forget to back the screws out and harden the holes in the balsa with thin CA.)

The instructions recommend a CG location that's $4\frac{3}{4}$ inches back from the leading edge, but an addendum on the Great Planes website (and in future kits) notes that the CG can be as far as 6 inches from the leading edge without affecting the U-Can-Do's flight performance. I moved the CG $5\frac{1}{2}$ inches from the leading edge, and it balanced perfectly with the battery under the fuel tank without additional weight; the plane came in at just over 5 pounds.

Last, I set up my Futaba 9CAP radio and

using minus 30 percent for low rates and minus 80 percent for high and 3D. The expo softens the controls around neutral, even when the plane is in 3D mode.

CONCLUSION

The U-Can-Do .46 is an extremely impressive model; you get big-plane performance without spending big-plane dollars, and it can be flight-ready in just 8 to 10 hours. It's an excellent model for those who want to move into 3D flight without spending a small fortune on a giant-scale aerobatic aircraft. You'll impress your flying buddies at the field in no time! ✈



The elevator and rudder servos are mounted externally at the rear of the fuselage; the short pushrods provide positive control.

Hobbico; distributed by Great Planes Model Distributors; hobbico.com.

O.S. Engines; distributed by Great Planes Model Distributors; osengines.com.

R/C City Products; distributed by Planes Plus Inc. (630) 904-9983.

Sig Mfg. Co. Inc. (800) 247-5008; (641) 623-5154; sigmfg.com.

Tru-Turn Precision Model Products; distributed by Romco Mfg. (713) 943-1867; tru-turn.com.

Wildcat Fuels (888) 815-7575; wildcatfuel.com.



SEE THE
U-CAN-DO
IN FLIGHT

HANGAR 9

by Roger, Colin & Mylis Post

Xtra Easy 2



"Hey, twins, I have a surprise for you."

"What is it, Dad? A video game?" asks 7-year-old Colin.

"A puppy?" inquires Mylis, his sister.

"No, even better than those: a model airplane you can fly!"

"Whoa! Let me see it!" exclaims Colin.

"Dad, can I fly it?" asks Mylis.

"You bet you can. I'll teach you how."

That's how the conversation went when I took home Hangar 9's Xtra Easy 2 from its Ultra Ready to Fly (RTF) series. It is said that this airplane takes all the guesswork out of installing a radio and engine in a model and eliminates the sometimes trying task of starting and breaking in an engine. This is well said because it is absolutely true. Hangar 9 has made the getting-to-the-field-sooner-so-you-can-learn-to-fly

process so simple that you can be ready to fly as soon as the batteries have been fully charged.

The model comes with a completely installed Evolution Trainer Power System that has the throttle cable and the installed fuel tank already hooked up. The JR 421EX computer radio system, which includes four 537 ball-bearing servos, an R600 ABC&W receiver, a switch and a battery pack, is completely installed and has preset throws. All the pushrods and the nose-gear assembly have been installed, too. Guesswork eliminated!

The RTF model is covered with UltraCote, and according to Hangar 9, it has a new trim scheme. It sure looks nice when you take it out of the box. I thought this would be a good starting model for my twins because in addition to its having trainer flight characteristics, no gluing is required to assemble it. All you'll need is a Phillips-head screwdriver and an adjustable wrench. They don't call it "Xtra Easy" for nothing.



Extraordinary all-in-one first plane



ASSEMBLY

Read the instruction manual—it takes only a few minutes—and then get to work. First, charge the battery for 24 hours—standard practice before using a new radio. As a test, I let Colin and Mylis do most of the assembly work to see whether young modelers would be able to put the plane together. They came through with flying colors and found only a couple of the procedures tricky.

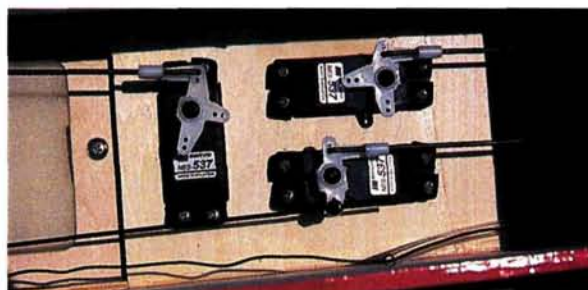
The wing is assembled first; it has an aluminum tube that acts as the dihedral brace and a little aluminum peg at the trailing edge to help line up the wing halves. Follow the four easy wing-assembly steps; during step 3, have someone tightly press the wing halves together while you wrap the tape around the center joint. This helps to avoid having any kind of gap between the wing halves. In step 4, you connect the aileron linkage to the right wing aileron clevis. You'll have to wait until the battery has been charged to do this.

Using the supplied thread-lock as indicated, mount the main landing-gear assembly with the short bolts, and then push the wing hold-down dowels into position. At this point, I had Colin check the tightness of all the bolts, screws and nuts to avoid having any loosen during flight.

We used the thread-lock again when we attached the vertical fin/rudder assembly to the horizontal stabilizer/elevator assembly (using washers and wing nuts), and we bolted the entire assembly to the aft



The Evolution Trainer Power System comes installed, and the fuel tank and throttle cable are already hooked up. Even better is that the engine is broken in and tuned at the factory, and the 3-blade prop and weighted flywheel keep the plane at a nice speed for first-time pilots. The engine started easily on the first try.



SPECIFICATIONS

MODEL: Xtra Easy 2

MANUFACTURER: Hangar 9

DISTRIBUTOR: Horizon Hobby Inc.

TYPE: ready-to-fly trainer

WINGSPAN: 69 in.

WING AREA: 793 sq. in.

WEIGHT: 6 lb., 8 oz.

WING LOADING: 18.90 oz./sq. ft.

AIRFOIL: flat-bottom

LENGTH OVERALL: 55 in.

ENGINE INSTALLED: Evolution Trainer Power System

PROP/SPINNER INCLUDED: 3-blade with plastic spinner

BATTERY USED: JR 750mAh flat pack

RADIO INSTALLED: programmable JR 421EX with 4 JR 537 ball-bearing servos

PRICE: \$379.99

FEATURES: can be assembled in less than 1 hour using only a Phillips-head screwdriver and a pair of pliers; Evolution Trainer Power System and JR 421EX computer radio and accessories included; control linkages installed; engine has been broken in and tuned so it starts easily; 3-blade propeller keeps the noise level low; radio installed and preprogrammed; no glue required for assembly; covered and trimmed in UltraCote; brand-new trim scheme; larger airframe enhances stability; two options available: sailplane launch and photo-op camera mount (camera not included).

COMMENTS

COLIN: It's a cool airplane that is easy to build—with Dad's help, of course.

MYLIS: I like the colors and the stars on the wing. One day, I'll give one of my small, stuffed puppies a ride in it.

DAD: the model can be assembled quickly, and the no-glue-required feature is great—especially when children are involved. The engine and radio installations are topnotch and save us the hassle of having to do it ourselves.

HITS

- Engine is easy to start.
- Well-done radio and linkage installations.
- Easy to fly; great trainer.
- Super-fast assembly.

MISSES

- None.

Left center: the Xtra Easy 2 comes with a JR 421EX computer radio system that can grow with pilots as they move on to more sophisticated aircraft. The four 537 ball-bearing servos, R600 receiver, switch and battery pack come completely installed with factory-set throws. The aileron servo (not visible in this photo) is attached to the bottom of the wing. Left bottom: the pushrods come installed—no guesswork here!

It's a sunny day at the end of June and school has ended for the summer. Yahoo! We're excited because today is the day we go to the field with Dad to fly our airplane.

"I'm flying it first."

"No, you're not; I am!"

"Nuh-uhh! I am!"

"DAAAAAAAAAAD!"

DAD'S INPUT

After a "lovely" trip to the field, we put the model together and rechecked its balance, control-surface movements and radio range. As the Evolution Power System has been broken in and its needle valves set at the factory, starting it at the field was rather easy: fuel it up, turn on the radio and receiver, prime the motor, lower the throttle stick to idle and flip the propeller with a chicken stick. The engine starts with two or three flips. If it happens to run in the wrong direction (slightly loaded because of too much prime), move the throttle trim lever up and down rapidly, and that should make it run in the correct direction. With its tricycle landing gear and large wheels, the XE2 taxis easily to the takeoff point.

TAKEOFF AND LANDING

At full power, the XE2 takes off in 20 feet and climbs at a 40-degree angle, without a hint of stalling. With its built-in right thrust, it needs only a minimal right rudder input to keep it tracking straight.

I hear, "Yay; it flies!" from the peanut gallery.

"What did you expect, dummy?!" comes the retort.

The landing speed is very low, so a short touchdown is easy. Line up the XE2 on final approach, control its descent with power and its air-speed with pitch, and the model grooves right in for a perfect landing. There's plenty of control authority to compensate for wind.



LOW-SPEED PERFORMANCE

With a low power setting and the addition of a little up-trim, the XE2 flies very slowly. With the factory setup, the mechanical aileron linkage lacked any kind of differential input, and adverse yaw was quite apparent. At low and high speeds, use rudder with ailerons to turn the model. At low speeds, the factory-set controls are very effective and the power-off stall has a gentle forward drop that is easily halted by adding power and releasing the pitch input.

HIGH-SPEED PERFORMANCE

Don't let the description "trainer" fool you. The XE2 can zip around the field at a brisk clip, and novice fliers will enjoy its flight qualities at faster speeds.

The higher speed is also necessary for doing aerobatics. The power-on stall has a sharper forward drop, but the wings stay level.

AEROBATICS

If you build up speed before you enter a maneuver, the XE2 will easily do the basic aerobatics: loops, rolls (add rudder to help it along), barrel rolls, split-S's, Immelmans, Cuban-8s, reverse Cuban-8s and wing-overs. It needs more rudder throw for better spin and snap maneuvers, but there is plenty of elevator throw for inverted flight. Yes, it will fly upside-down. If you want it to do the more rigorous maneuvers that can test any airframe, I suggest that you glue the wing halves together. When the twins are comfortable flying it, I'll bump up the control throws so that the model will be able to do snappier maneuvers, and I'll glue the wing panels together. The model's size is a plus because it makes it easy to see from the ground, and it enhances flight stability.

"Yay, Dad didn't crash it!"

"Gee, thanks, guys!"

"Can we fly it now?"

"Go ask your mother."

fuselage with the longer bolts and the corresponding washers. The final step in this process is to hook the control rods to the rudder and elevator clevises.

Last, install the propeller and spinner. The instructions detail the procedure very explicitly, so please follow them. The model is now complete.

The entire process took about an hour; we had a snack break because somebody was hungry. Also, Mylis went on to other things, so Colin finished most of the work.

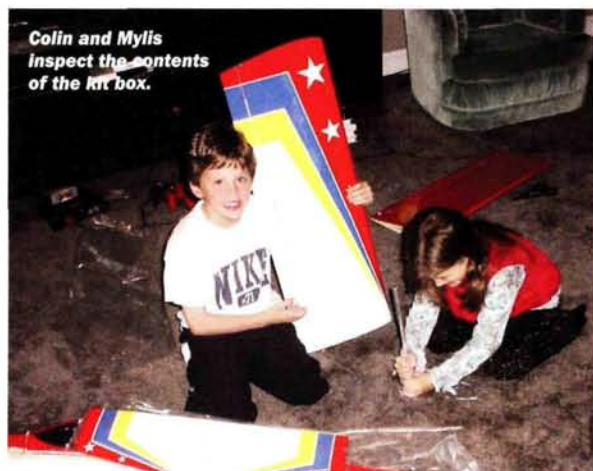
"Dad, can we go fly it now?" asks Colin.

I think that's a fair question, so I answer, "We have to wait until the batteries have been charged. We can go tomorrow."

"That stinks! You mean I did all this work, and we can't fly it now?" [Note to self: always charge the batteries for 24 hours before announcing the arrival of a new RTF model!]

FINAL PREPARATIONS AND WRAP-UP

When the batteries had been fully charged, we hooked up the



Colin and Mylis inspect the contents of the kit box.



One day after we assembled the aircraft, Colin is ready to go flying. All we have to do now is find Mylis.

control surfaces and mechanically centered them. I had to adjust the throttle servo's high-end travel, as it went too far and caused some binding. The other factory-set radio adjustments were fine: all the controls moved in the correct directions and there seemed to be enough control-surface throw for the model to fly.

Having attached the wing using the supplied rubber bands, we checked the plane's balance. Nowhere in the instructions does it indicate where the CG should be, but we used the spar as the balance point. [Editor's note: Hangar 9 informs us that the CG location has been omitted intentionally; because the model is factory built, the CG will always be within its intended range. There's no need for the builder to check this.] The model balances perfectly on this spot. This absence of a CG reference is an oversight, though, and I'm sure it will be addressed in future instructions updates.

As you can see, there isn't much to assembling this plane. Hangar 9 has finished all the major work for you and has done a great job. The model is well built of solid construction materials, so it can take all the less-than-perfect landings for which beginner pilots are famous.

Pick one up and start to train the next generation of RC fliers, or buy one for yourself. You can't go wrong with the Xtra Easy 2. Happy flight training. ✚

Horizon Hobby Inc. (800) 338-4639;
horizonhobby.com.

OK MODELS

DJ-1



by Rick Bell

Back in the '80s, OK Models' Pilot kits were the hottest ones on the market. It seemed as if everybody was building one and had another kit waiting to be built. Tragically, the factory where the kits were produced was destroyed in an all-consuming fire. Today, Pilot kits are highly treasured by collectors and builders alike.

I had never built a Pilot kit, so when the opportunity came along to build and review OK Models' newest laser-cut kit, the cool-looking DJ-1 flying wing, I was only too happy to tackle it.

THE KIT

The DJ-1 comes in a rather small box that's packed well. My first thought was: "Where's the rest of the kit?" When OK Models' engineers designed the DJ-1, they designed it as a fast, easy-to-build model with a low parts count. They used a laser to cut the parts with incredible accuracy; if you've never built a laser-cut kit before, you're in for a pleasant surprise.

The rolled, one-sheet plan is very nicely drawn and includes the instructions to build the model; there's no separate instruction manual. To help you build the model, there are quite a few photos on

the plan sheet that show several stages of construction. The photos are laid out sequentially and are very detailed.

The kit includes vacuum-formed plastic parts for the cockpit tub and the rear deck, a fairing for the main wheel, a blue-tinted canopy and miscellaneous hardware. Surprisingly, control horns, pushrods, hinges, decals and the main wheel aren't included in the kit.

If you want to make the DJ-1 logo, you can go to okmodel.co.jp/DL-sticker.htm and download the DJ-1 images for patterns. (The website is in Japanese, but if you scroll down the page, you will see "DJ-1"

with a link to a 22kb pdf file to the right of it; there's also a link on that page to download Adobe Acrobat Reader, if you need it.)

CONSTRUCTION

Before you start to build the DJ-1, you have a couple of decisions to make: which power system to use and whether you want the nose gear to retract. By far the coolest way to power the DJ-1 is with the ducted-fan unit (DF-2) that MRC offers (item no. 043573). It's a complete package



A zippy flying wing for ducted fans

that includes a .18 Toki pull-start engine, a tuned pipe, the fan and duct unit and all the necessary hardware. You could also use a .15 engine mounted on a pylon in a pusher configuration.

Your last decision concerns the nose gear. The kit provides a long wire that acts as a skid, but I think MRC's retracting nose gear (item no. 033198) is the way to go.

Fuselage pod. Before you begin, identify the parts in the laser-cut sheets. I followed the plan and assembled the fuselage, making sure that I built a left and a right side that I later joined with formers and internal braces. Because the fuselage construction is tab-and-slot, hold the assembly together with rubber bands before you apply any glue. This allows you to line everything up on the fuselage top view for perfect alignment.

I glued the nose blocks into place and then added the bottom sheeting before I shaped them. (For all the construction, I used an assortment of ZAP CAs and epoxy.)

SPECIFICATIONS

MODEL: DJ-1

MANUFACTURER: OK Models

DISTRIBUTOR: MRC

TYPE: ducted-fan flying wing

WINGSPAN: 39.4 in.

LENGTH: 35.2 in.

WING AREA: 496 sq. in.

WEIGHT: 2.5 lb.

WING LOADING: 11.90 oz./sq. ft.

ENGINE REQ'D: .18 2-stroke w/ducted-fan unit or .15 2-stroke in pusher configuration

ENGINE USED: Toki .18 2-stroke w/matched DF-2 ducted-fan unit

RADIO REQ'D: 3-channel w/3 miniservos (throttle and 2 elevons) or 4-channel w/4 servos (optional retract)

RADIO USED: JR8103

FUEL USED: Wildcat 30% Heli

PRICE: \$309 (w/ducted-fan unit); \$119 (plane only)

FEATURES: laser-cut parts; premium balsa; interlocking construction; vacuum-formed rear fuselage deck, canopy and wheel fairing; plumbing for engine; hardware package; plan sheet with pictorial instructions.

COMMENTS: this is my first OK Models kit, but it certainly won't be the last. The quality of the laser-cutting and balsa was perfect. The interlocking construction and low parts count made building the kit pretty easy; it was like piecing together a jigsaw puzzle. The instructions on the plan sheet are informative, but they might be a little difficult to understand if you've never built a kit before. The recommended ducted-fan unit makes for good, exciting flights.

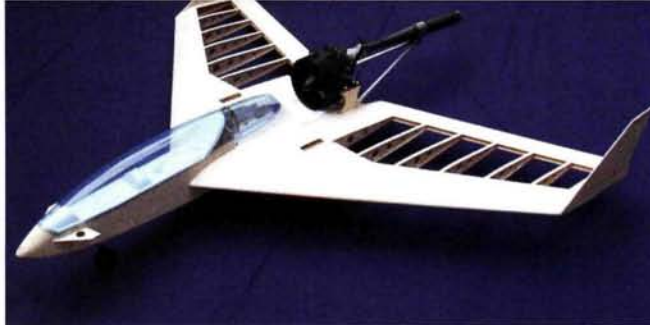
HITS

- High-quality materials.
- Outstanding engineering.
- Easy to build.
- Exciting design.
- Fun to fly.

MISSES

- Only one wing panel is printed on plan.
- Decals aren't included.

If you use the retractable nose gear, outline the wheel opening with the included balsa when you install it. For a smooth transition, I trimmed the canopy and the cockpit tub and placed them on the fuselage as guides. The canopy/tub assembly is held in place with a tab and slot at the front and a single screw toward the rear.



Here's the DJ-1 sanded, assembled and ready for covering. Sure is a sharp-looking model!

then lay the plan on it upside-down. To make the lines of the wing visible, smear a little light machine oil over the

The DJ-1 doesn't come with a fuel tank, and the area designed to hold one is small. OK Models made a tank especially for the DJ-1 (item no. 033017), but I wanted to see whether I'd be able to squeeze in something else. The fuel-tank compartment tapers at the rear and herein lies the problem. I found that a round, 4-ounce, Sullivan tank fits with some massaging; the tank's rear was a little too wide, so I used a heat gun on it until it was pliable; then I pushed the rear sides in until it fit in the compartment.



The wing panels are easy to build. Note the lightening holes and the interlocking construction.

Wing assembly. The wing is easily built in halves (thanks to its simple layout and interlocking parts) that are attached to each side of the fuselage. To attach the wing securely to the fuselage, three braces pass through the fuselage and into the wing. The airfoil is semisymmetrical, and the ribs have tabs on their trailing edges so that they'll line up when they're pinned down. Before you begin to assemble the wing, splice the sub-leading edges together and make two sets. This is also a good time to splice together the leading edge sheeting; build the left wing panel first.

Pin the bottom spar and the ribs to the plan sheet, which you should protect in some way (I used Great Planes' Plan Protector). Before you pin down ribs C1, D1 and E1, add the servo mount to the ribs, but don't glue them yet! The servo openings in the mount are sized for miniservos, so if you plan to use a servo of standard size, enlarge the openings now because it will be very difficult to do so later. The top spar, the sub-leading edge and the trailing edge are added to the ribs without glue; align all of the parts and use thin CA to tack-glue them together.

To build the right panel, lay a sheet of Plan Protector on your building surface and

wing and rib outlines. Cover the plan with another sheet of Plan Protector and build the right wing panel. After you've built the panels, cut the openings in the top sheeting and install the servos. I added scrap plywood under the mounts so that the servo screws would have more wood to bite into. Sheet the bottom of the wings and add the leading- and trailing-edge stock. I shaped the leading and trailing edges, hinged the ailerons and sanded the wing panels.

Final assembly. I built the center brace, placed it and the other two braces in the fuselage and installed the wings. Everything lined up perfectly! I fitted the plastic rear deck, assembled the ducted-fan mounts, installed them in the wings and fitted the ducted-fan unit to the model. I fitted the main wheel bracket to the fuselage underside and trimmed the fairing to size; it's installed after the model has been covered. You'll need to supply a 2½-inch-diameter wheel.

Last, I built the twin vertical fins, sanded them to shape and covered them. After I had built the model, I disassembled it and gave it a final sanding before I covered it. To cover the model, I used yellow, white and metallic plum Top Flite MonoKote and a matching LustreKote paint trim.



The exposed ducted fan makes life pretty easy. You just screw it into the pylon mounts and onto the rear of the wing.



The only servo that goes in the fuselage is the retract servo. The battery and receiver are installed at the very front to counterbalance the power system at the rear of the model.

Because I mostly fly from grass runways, I installed a towhook in front of the retractable nose gear, so I could bungee-launch the model. Before I launch it, I retract the nose gear, so it won't snag on the launch cord.

TAKEOFF AND LANDING

Here comes the fun part: getting the model airborne! Because I was bungee-launching the DJ-1, I needed a helper to hold the model after I hooked it up to the stretched bungee cord.

After I determined the wind direction, I stretched the bungee downwind 40 to 50 feet and then held it to the ground with a stake. After I started the engine, my helper held the model, and I attached the bungee to the towhook. My helper then held the model on the ground with its wing level and waited for my release signal. After a control check, I held a little up-elevator, and I signaled my helper to release the model. He then just let go of it; he didn't have to push or do anything else. The model very quickly accelerated to flying speed, and I needed only to keep the wing level during the launch. After the launch, I kept the climb angle shallow to build up some speed before I made the first turn away from the pit area. If you have access to a paved runway, the DJ-1 has enough power to take off under its own power.

Landing the DJ-1 is very easy, as its slow-flight characteristics



are very gentle. After lining up on the runway's centerline, the glide slope is easily controlled with elevator and throttle. Just before touchdown, I cut the throttle and gently glided in.

LOW-SPEED PERFORMANCE

In slow flight, the DJ-1 is very stable and glider-like. That's quite a surprise considering the model's aggressive looks. The controls remain effective, but don't make sharp turns, as you'll quickly bleed off airspeed and stall. It takes a fair amount of effort to stall the model. As a stall is reached, the nose just drops a little until flying speed is regained; I didn't notice any snapping tendencies.

HIGH-SPEED PERFORMANCE

The DJ-1 is a zippy model that scoots right along. Full-throttle flight is exciting and smooth; it grooves like an arrow. The recommended control throws are a good place to start, but I found them to be a little soft for my liking.

AEROBATICS

I wasn't expecting the DJ-1 to perform the same aerobatics as an Extra 300, but I was happy to see that it can easily perform loops, (really nice) axial rolls, split-S's, Cuban-8s, reverse Cuban-8s and any other maneuver that doesn't require rudder. I'm glad that I chose to use the box-art color scheme, as it's very visible in flight. All in all, the DJ-1 is a great flying model.

I trimmed away the covering where the wing panels are attached to the fuselage and epoxied them into place. I installed the receiver, its battery, the switch harness and the retract servo in the fuselage; I installed the remaining servos in the wing and then installed the fan unit. I checked that the retractable nose gear was operating properly, and then I installed the main wheel and its fairing. I glued the vertical fins to the wingtips, and because I fly the plane off a thick grass runway, I mounted a towhook in front of the nose gear so I'd be able to bungee-launch the model.

FINAL THOUGHTS

OK Models' DJ-1 is a cool-looking, fun-to-fly, ducted-fan model that won't break the bank. Thanks to its sleek design and high-performance power system, the DJ-1 flies as well as it looks. The laser-cut parts are superb, and the model's interlocking construction makes building it fast and easy. Although the kit doesn't include all of the necessary hardware, don't be put off; most of you have the stuff that's lacking hanging around your shop anyway. If you're looking for something different to stand out on your flightline, look no further than the DJ-1! ✚

Great Planes Model Distributors (217) 398-6300; (800) 682-8948; greatplanes.com.

Hobbico; distributed by Great Planes Model Distributors; hobbico.com.

JR; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

LustreKote; distributed by Great Planes Model Distributors.

MonoKote; distributed by Great Planes Model Distributors.

MRC (732) 225-2100; modelrectifier.com.

OK Models; distributed by MRC.

Sullivan Products (410) 732-3500; sullivanproducts.com.

Toki; distributed by MRC.

Tower Hobbies (800) 637-4989; towerhobbies.com.

Wildcat Fuels (888) 815-7575; wildcatfuel.com.

Zap zapglue.com.

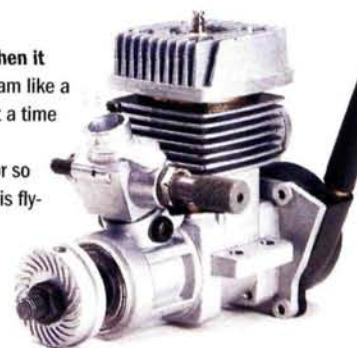
TOKI .18 – A MINIATURE POWERHOUSE

A .15-size engine mounted in a pusher configuration can power the DJ-1, or it can be set up with a ducted-fan unit that uses a specially designed Toki .18 ducted-fan engine.

The power system includes the engine, the fan and adapter, the spinner, the outer shroud, the tuned pipe, the coupler and needle-valve and throttle-arm extensions. For easy startup, the engine has a pull-starter mounted on its rear. This is a nice feature; you don't need any special starting equipment.

Before I mounted the engine on the model, I decided to break it in on a test stand. This allowed me to become familiar with operating the engine and to adjust the length of the pipe for maximum rpm. I ran the engine on 30-percent Wildcat heli fuel and with the fan attached (after I balanced it) to duplicate the same conditions as when the engine is installed on the model. I found the Toki engine to be very user-friendly; it started on the very first pull. Here are some tips and observations to make running the Toki easier.

- **Use a high-quality, high-nitro-content fuel.** Small, high-performance engines like the Toki run great on 30-percent nitro. Make sure that the fuel is at least 18-percent oil for proper lubrication and cooling.
- **Before you install the fan, it's a good idea to balance it.** Remember, the fan will be turning 23,000 to 24,000rpm and producing 2.4 pounds of thrust. A Robart balancer works well.
- **Securely tighten the fan nut.** If it isn't really locked down, you run the risk of it coming off during flight. A little thread-lock on the crankshaft is also a good idea.
- **When you start the engine with the pull-starter, use short, sharp pulls.** Don't try to use the full length of the cord; you'll overextend the recoil.
- **Play with the length of the tuned pipe.** The instructions tell you to start with 340mm from the exhaust port to the end of the pipe; on my installation, 345mm was the optimum length.
- **When tuning the engine on the ground, you'll hear when it "comes on the pipe."** It will pick up rpm and just scream like a turbo kicking in; make needle adjustments one click at a time and allow the engine a few seconds to respond to the adjustment. After the needle is set, back it off a click or so to prevent it from running overly lean; when the model is flying, the engine will unload a few hundred rpm.
- **Last—have a blast!**





FLAIR PRODUCTS
Stearman

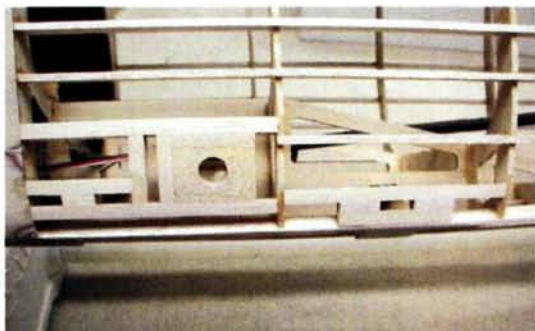


A flying legend you can build by Fred Coleman

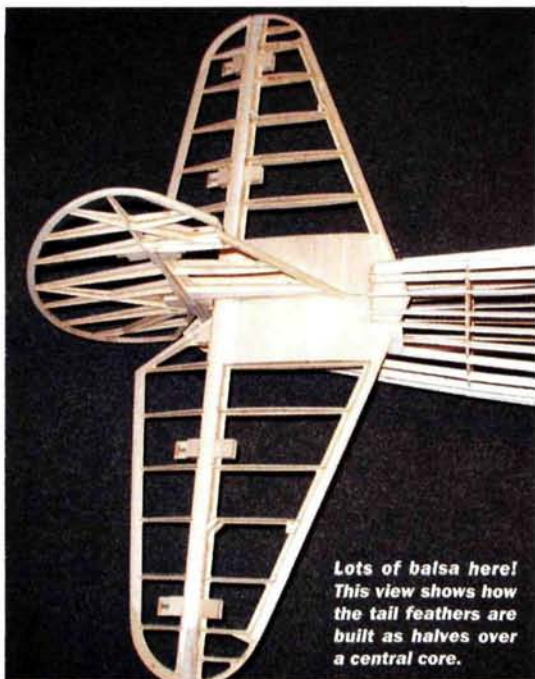
PT-17

The classic biplane of all time has to be the PT-17 Stearman. Designed by Floyd Stearman, the PT-17 epitomizes the saying that "real airplanes have two wings and round engines." This was the last military biplane to be produced, and it met the needs of both the Army and the Navy as a primary trainer. A total of 10,346 aircraft were built, and many are still flying and earning their keep as spectacular airshow performers.

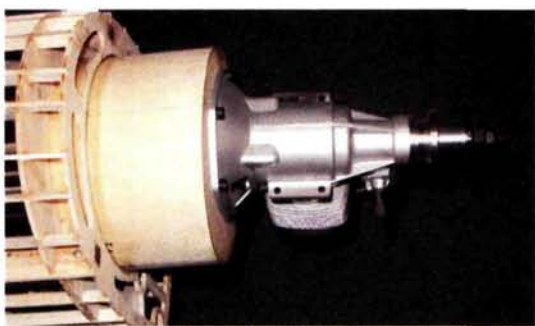
Stearman lovers who have wanted to build a model were pretty much limited to scratch-building from a set of plans. Now, Flair Products Ltd. remedies this with its giant-scale PT-17 kit.



To better support the covering on the fuselage where the wing attachment bolts protrude, I added pieces of balsa for the covering to adhere to.



Lots of balsa here! This view shows how the tail feathers are built as halves over a central core.



Here, the engine is mounted on the engine tube. The tube slides fore and aft to place the thrust washer at the correct distance from the firewall. It's then glued into place.

KIT CONTENTS

The huge size of the box told me that a small forest of balsa, plywood, balsa sheets and strip stock was inside. All of the wooden parts are bagged by assembly group and are die-cut and CNC-router cut. You'll need to identify and number the parts before you remove them from their carrier sheets. The 55 pages of instructions take you through every step of the model's construction with photos and text for each step. There are also three sheets of CAD-drawn plans, and the wing drawings are on transparent sheets, so it's easy to build both the left and right panels.

Also included are a dummy engine kit, a 20-ounce

fuel tank, 5½-inch-diameter wheels, ABS plastic parts, a fiberglass cowl and parts to build functioning Oleo landing gear.

Construction. It's important to follow the building sequence as spelled out in the instructions. This is a complex kit, and Flair went to great lengths to avoid any building problems. Most of the model is built of plywood with lite-ply in high-stress areas and balsa stringers and sheeting where appropriate.

Tail surfaces. The tail-feather assemblies are split horizontally and built on a core of thin die-cut plywood. This method of upper and lower sections (or left and right for the vertical fin) all but guarantees that the assembly comes out straight. Note that the stabilizer has positive 3 degrees of incidence when assembled to the fuselage.

Fuselage. A unique feature of the fuselage is the telescoping engine-positioning structure. It's basically a plywood tube that slides forward and aft depending on the engine being used. This telescoping structure makes engine alignment a breeze. Before you glue the structure together, you must determine the amount of downthrust and right thrust needed. Because I installed a slightly larger engine than the 1.80 4-stroke called for, I built in 3 degrees of downthrust and right thrust. Be careful laying out the thrust lines on the drawings, as the top and side views do not agree on the firewall location. I used large nylon tie-wraps to hold the sheet plywood around the formers while the glue dried. Instead of fiberglassing the tube, as recommended, I



The cabane struts are built into the fuselage, and the wing center section stays attached to the struts. Note the scale handholds in the trailing edge of the wing.

SPECIFICATIONS

MODEL: Stearman PT-17

MANUFACTURER: Flair Products

TYPE: ¼-scale biplane

WINGSPAN: 89 in.

LENGTH: 69½ in.

TOTAL WING AREA: 2,365 sq. in.

WEIGHT: 24½ lb.

WING LOADING: 23.87 oz./sq. ft.

ENGINE REQ'D: 1.20 2-stroke, 1.50 to 1.80 4-stroke, or 30cc gas

ENGINE USED: O.S. BGX 35cc converted to gas and ignition

RADIO REQ'D: 4-channel w/5 servos (elevator, rudder, throttle, 2 ailerons)

RADIO USED: Futaba 7UAPS transmitter w/2 S9304 (ailerons), 1 S3101 (throttle), 1 S134 (elevator), 1 S131 (rudder) servos

PROP USED: Zinger 20x10

PRICE: \$525

FEATURES: good-quality selection of wood; die-cut and CNC-cut parts; excellent building plans; well-written, photo-illustrated, 55-page instruction manual; excellent engineering; many scale details; complete hardware package; dummy engine; working Oleo landing gear; metric to U.S. conversion table.

COMMENTS: the Flair Products Ltd. Stearman PT-17 is a well-engineered kit that is not intended for beginners or intermediate builders; you should have built several kits before tackling a project of this size and complexity. The instructions are extremely well thought out and well written; seasoned builders shouldn't have any problems. The quality of all the supplied materials (except the plastic fairings) was excellent throughout, and the parts that I did change were only for personal preference. With very little effort, the PT-17 can become a scale model that you'll be proud to compete with.

HITS

- Superb photo-illustrated instructions.
- Excellent engineering.
- Top-quality materials and hardware.
- Beautiful plans.

MISSES

- Plastic fairings should be fiberglass.
- No information on engine and radio layout.

reinforced it by wrapping Kevlar strips around it, and then I coated it with epoxy. When you install the engine-mounting tube, its rear edge may not align with the rear of the upper former. Don't worry about this; it's more important that engine clearance at the front of the cowl is correct. I powered the plane with a 35cc O.S. BGX that I converted

Scale enhancements

The Flair Stearman is a real showstopper when built with the kit-supplied materials. But if you decide ahead of time which full-scale model and which details you'd like to replicate, you can turn the PT-17 into an outstanding scale model. Before you start building, you need to gather a set of 3-views and detailed photos of the full-scale aircraft. In the past, I've turned to Bob's Aircraft Documentation for the information needed.



The working Oleo struts are a nice feature of the PT-17 kit, but they look rather naked without the drag links. The links are available from Robart and are easily added to the gear legs. I used J-B Weld to attach small lengths of brass tube to the legs, and when this had cured, I simply attached the drag links.

The two open cockpits are the first areas that cry out for detailing. To do this, you must plan where in the fuselage to position your servos, batteries and receiver so that they're hidden from view but still accessible. In my Stearman, I placed the two 1200mAh battery packs (one for the radio and the other for engine ignition) inside the cylindrical engine mount. I made two compartments to house them horizontally and directly behind the firewall. This also helped with the CG, as I knew that my engine was very light. I also placed the servos for the elevator and rudder on the bottom of the model under the fuel tank. This kept them out of sight when I installed the floorboards.

Using my 3-views and photographs, I sketched the fuselage substructure over the kit's plans and con-



Detailing cockpits isn't that difficult; a couple of pictures and a little planning are all you need. Here I've used a wooden dowel to represent the welded fuselage structure that's visible in the cockpit.



The front cockpit with the instrument panel installed. Note that I painted all of the visible structure through the cockpit. Pretty convincing!



A view of the cockpit from the left side before the fuselage is covered. Note how the substructure is attached to the fuselage formers for support.

structed a framework out of wooden dowels to represent the internal structure that's visible through the cockpit. The seats are constructed of litho plate and plywood with dowel supports that plug into the floorboards. The floorboards and substructure are built out of dowel and plywood. No open-cockpit model would be complete without a pilot figure, so I added a full-figure pilot from Officers and Gentlemen.



To duplicate the Stearman's flying wires, I used Nelson flying-wire material. The flying wire is made from stainless steel and is rolled (formed) to a realistic elliptical streamline cross-section. This is the same shape as you find in full-scale flying wires.

As well as to the cockpit, I added detail to the exterior: rib stitching, metal panels where there was metal on the full-scale plane, rivets, the drag links on the landing gear and scale windshields. I also used Nelson Hobby Specialties flying wire to make the rigging.

To fully capture the essence of the Stearman, I used fabric to cover the model—no plastic iron-on covering for this grand old lady. I've used Nelson's Lite Fab on other projects with good results, so I used it on the Stearman. To further the scale appearance, I brushed on Nelson's System 3 water-based paint. I used a foam brush (remember that the full-scale planes were seldom painted with anything but a brush). As a final touch, I added custom graphics made by Cajun R/C Specialties. I just sent them a picture of the graphics and told them the scale that I needed. I think the results speak for themselves!

to gas with a Pro Spark electronic ignition system, and I mounted all of the electronics with the exception of the 1200mAh battery pack on the engine tube. This was a very good guess, as the plane balanced exactly on the indicated CG. Because I used a larger engine, I also added a layer of 1/8-inch plywood to the firewall. If you use a Pitts-style muffler, check for clearance at the firewall, make any adjustments, and install the engine-mounting blind nuts.

The fuselage is now framed up, and it's built as upper and lower halves. The bottom is built first and starts as a crutch to which you add the formers and stringers. Then remove the assembly from the work surface and add the top formers and stringers. Be sure to dry-fit the parts and align them before gluing

them together. Now would be a good time to plan your radio installation, as there is no access to the interior (other than the cockpit



Here's the bottom of the lower left wing panel, covered and ready for paint. The rib count and spacing are true to scale, as is the rib stitching.

openings) after the fuselage has been covered. When I installed the tailwheel assembly, I used a Du-Bro steering arm instead of soldering the kit-supplied steering arm to

make the assembly. This makes it easy to service or remove the tailwheel, if necessary.

Before I started on the forward fuselage sheeting, I fastened the undercarriage strengthener to former 36 with small screws to keep it in place. I also added several balsa blocks where the wing-retention bolts are installed to provide backing for the covering. I also added blocks where the aluminum wing-joiner spars and the aileron connectors exit the fuselage.

The landing gear comprises working Oleo legs that you need to assemble. The gear legs are bolted to a substantial metal plate that carries and spreads the loads of the landing gear.

I enhanced the gear by adding Robart drag links to the front of both legs, as these are a predominant feature on the full-size plane. I used J-B Weld to attach small lengths of



STEARMAN PT-17

The hardy schoolmarm

I clearly remember my thoughts when I walked up to a Stearman for the first time. I thought, "Wow! Doesn't America do anything on a normal scale? This thing is BIG!" Where Germany had its lithe little Jungmann and England had its wonderfully archaic Tiger Moth, we had our hulking Stearman, which, incidentally, weighs nearly as much as the other two put together. There's nothing about this trainer that is anything but "manly" in the true American sense of the word. Just getting up on the wing is an adventure in stretching, and those who are vertically challenged will be looking around for a step stool.

The cockpit is as big as the rest of the airplane. When you snuggle down into the cockpit of a Jungmann or a Tiger Moth, you get the feeling that leprechauns designed them while a Texan designed the Stearman. With its adjustable rudders, bat-size control stick and rudder pedals designed for galoshes, it's sized for NFL running backs.

It's truly a kick to start a Stearman. The geared starter on the 220hp W-670 Continental (or 225hp Lycoming) has a thoroughly identifiable whine and, after the engine has turned over a few blades and the mags are moved to "on," a series of flat, bronchial-sounding coughs sends puffs of blue smoke past the open cockpit. There's nothing like a round motor that's waking up.

Lined up on the runway, your first impulse is to ask, "What runway?" because you see nothing but airplane for about a 30-degree arc straight ahead. That, however, is not a serious problem. You can clearly see the sides of the runway on each side, and the edges form triangles with the nose and the lower wing. Keep the triangles equal on each side of the nose, and you're in the middle of the runway and straight. Let one triangle get bigger and the other smaller, and you're turning.

When most general-aviation pilots firewall

the throttle on the Stearman, they'll feel as if they've awakened a happy buffalo. The engine sound has mass to it, but it feels as if it is loafing as it urges the airplane forward. Wait a few seconds for airspeed to build. Stick forward, and the tail obediently comes up, which greatly improves your visibility. You still can't see directly ahead, but there's a lot more runway to look at.

Your eyes are busy analyzing what the nose is doing. Is it trying to turn? There; a little rudder stopped it. Oops, now a little the other way. Somewhere in the middle of that commotion, the Stearman's wings fill with lift, and it floats off the ground. No big deal. It just got tired of waiting and took off.

Stearmans will do a lot of things well, but climbing isn't one of them; its 220hp just isn't enough. It also is not a nimble aerobat like the Jungmann or a dainty maple seed like the Tiger Moth. If you want to move a man-size airplane, you need to use man-size muscles.

As the nose comes up on landing, the center of the runway once again disappears, and the world slows to a walk. Hold it off! Hold it off! Plunk! Hippy-hop, you're down, and your eyes are once again darting from side to side, signaling your feet when it's time to tap dance on the rudders to keep it straight.

As you turn off the runway, you're sure of two things: first, you've just had a terrific time, and second, every eye at the airport is watching you. It's good to be envied.

—Budd Davisson

Editor's note: Budd Davisson, pilot extraordinaire and editor-in-chief of our sister publication Flight Journal, has been a certified flight instructor for 35 years. He has logged more than 6,000 hours as a pilot and flown nearly 300 types of aircraft, including the venerable Stearman PT-17.

$\frac{3}{16}$ -inch-o.d. brass tube to the legs and then bolted the drag links to them. I also made the landing gear removable. To accomplish this, I made additional formers and added them to the fairings so that they are only attached to the leg and can be removed with the leg. Instead of trying to wrap the 0.8mm plywood around the legs, I used two layers of 0.4mm plywood and laminated them with 3M 77 adhesive. This prevents the plywood from breaking at the front former. When this was complete, I covered the leg fairings with Silver UltraCote Plus that I burnished with a fine Scotch-Brite pad to achieve an aluminum effect. I covered the joint between the two formers with an O-ring for a scale look.

Wings. The wing construction is well thought out and has some unique features. You must build four panels and the upper wing center section. The lower wing panels plug into the fuselage. The ailerons use scale hinging and are actuated by pushrods from inside the wing. When building the ailerons, drill the hinge bolt holes with a $\frac{7}{64}$ -inch drill bit to accept the metric hinge bolts. Be sure that you have a no-slop fit where the 3mm clevis attaches to the actuation rib. Once this has been assembled, you cannot adjust it. To keep the main spars vertical during assembly, I constructed jigs to hold them in place. Note that both the top and bottom wings have a positive $3\frac{1}{2}$ degrees of incidence. I also made the aileron servo covers from litho plate and fastened them with small screws to a frame that I used to line the hatch openings.

The Flair Products Stearman PT-17 is an outstanding kit.

When building the wing-retention system, I temporarily glued the metal pieces into place with CA until everything lined up; I then used epoxy to hold the assembly permanently. To make the upper and lower wings parallel, I first blocked up the fuselage until it was level. I've found that by using a string and plumb bob and draping it over the top wing (after making sure that the wing's leading edge is straight) and measuring from the string back to the lower wing's leading edge, it's easy to see whether the wings are parallel to each other.

To keep assembly time at the field to a minimum, I spliced the joints in the interplane struts with $\frac{1}{16}$ -inch plywood to make assemblies; the kit has the struts as individual pieces. I also used 4-40 socket-head machine screws and blind nuts to fasten the struts to the mounting brackets in the wings.

Radio installation. I used a mixture of high-torque Futaba servos except in the throttle, where I used a Futaba miniservo that I mounted on the engine tube by the firewall. The kit supplies steel cables for the rudder and tailwheel steering. I used the supplied arm and spring fittings, but I used Kevlar thread for the control cables, as I was concerned about radio interference. I laid the elevator servo on its side on the bottom of the fuselage and used a carbon-fiber pushrod, and I installed the aileron servos per the instructions.

Covering and finishing. As this was a fabric-covered airplane, I decided to use Nelson Hobby Specialties Lite Fab fabric. This is an adhesive-backed covering, and it goes around compound curves with ease. I added rib stitching where appropriate.

Before flying the PT-17, I ran up the engine and tuned it for the day's conditions and did a range check of the radio to make sure that the electronic ignition didn't cause any radio interference.

TAKEOFF AND LANDING

Before taking off, I did a ground-handling check and noticed that the tailwheel steering was very effective. I also noticed that if rudder and throttle were aggressively applied, a wingtip could be dragged in the grass. With the Stearman facing into the wind, I gradually applied throttle and steered it with the rudder; after about a 30-foot roll, the Stearman was airborne and climbing out nicely. That certainly was easy! I flew a few circuits around the field to get a feel for the model and added a few clicks of elevator and aileron trim. It quickly became very obvious that the Stearman was a stable flyer—no wonder the military used it as a trainer!

Landing the Stearman is a no-brainer. Just line it up on the centerline and control the descent rate with throttle. The plane has a lot of drag, so don't fully close the throttle until you're ready to touch down and flare. The working Oleo landing gear does a great job of smoothing out any bumps.

LOW-SPEED PERFORMANCE

This is a large, scale plane with lots of things hanging out in the breeze, and it slows as you would expect. There weren't any surprises, and control authority was remarkably solid during slow flight. I climbed the model to a safe altitude and performed the mandatory stall tests. After I closed the throttle, the model became almost motionless and then dropped a wing. Recovery is accomplished by adding power and letting the model regain flying speed before leveling off. The Stearman looks great flying circuits around the field at partial throttle settings.

HIGH-SPEED PERFORMANCE

High speed in a Stearman is relative; Stearmans weren't known for their blistering speed. Handling at higher speeds remains nicely balanced and smooth. A little rudder coordination and differential aileron applied during turns helps steer the big Stearman through turns. This is outlined in the manual.



AEROBATICS

I've seen many Stearmans perform aerobatics at airshows over the years, so I had a good idea of what I wanted from my model. To do justice to this plane, aerobatics should be flown smoothly rather than just jamming the sticks to perform maneuvers. I started out by doing a few stall turns and found the rudder to be quite effective. Loops were just plain graceful; I could almost hear the roar of a radial engine as the model went over the top. Rolls were a little on the slow side, and you have to apply rudder and elevator during the roll to make it axial. Spins are especially exciting to perform because they look so spectacular. Just make sure that you give yourself plenty of room for recovery. Remember, this isn't a Pitts Special! All in all, flying the Stearman is magical.



I detailed the cockpits by adding instrument panels, seats, floorboards, side panels and a pilot figure.

I also painted the plane with Nelson Hobby's System 3 paint. If you don't have access to spray equipment, Nelson paint is an ideal solution, as it is water-based and does not have any odor. I didn't need to prime the fabric before painting it, but I did prime the metal surfaces. I applied six coats of yellow and red paint with a foam brush. To detail the Stearman, I marked up a set of Bob's Aircraft Documentation photos and sent them to Model Graphics to have custom graphics made. After I had applied the graphics, I put two coats of clear on the entire model to fuelproof everything.

Final details. The ABS plastic moldings and fairings that are furnished with the kit are quite thick. I think these could have been made of fiberglass to make them thinner and easier to use. The ABS parts fit quite well. I did not glue the tailwheel fairing into place but instead fastened it with small screws.

A very distinct feature of just about any Stearman is the exposed radial engine, and Flair thoughtfully included a 6-cylinder, dummy radial engine with plastic cylinders and a fiberglass crankcase that you need to cut to fit your engine of choice. I also added some wiring and other details.

Another feature that stands out is the plane's rigging; a Stearman just doesn't look right without it. The kit provides materials for the rigging, but I wanted a more scale look, so I used Nelson Hobby Specialties metal flying wire on the wings and the method Nick Ziroli presented in the April 2002 issue of *Model Airplane News* for the tail.

I substituted a Sullivan fuel tank for the kit-supplied one, as it better suited my installation. I mounted the tank on a slide-out shelf to provide access to the batteries. Because the tank is visible through the cockpit, to disguise it, I wrapped it with 1/4-inch plywood and then covered the plywood

with Silver UltraCote. All that was left to do was to assemble the finished components and balance the model.

FINAL THOUGHTS

The Flair Products Stearman PT-17 is an outstanding kit. You'll get a lot of satisfaction from constructing this giant-scale plane. The kit is very complete and includes just about everything needed to build it. With very little effort, the PT-17 can be turned into a competitive scale model that's a real showstopper. A neat thing about the PT-17 is its versatility; it can be decked out as a colorful civilian airshow performer or as a military trainer. Either way, the Flair PT-17 is a great addition to any giant-scale modeler's hangar. ✦

Bob's Aircraft Documentation (714) 979-8058; bobsairdoc.com.

Cajun R/C Specialties (337) 269-5177; cajunrc.com.

Du-Bro Products (800) 848-9411; dubro.com.

Flair Products Ltd. flairproducts.co.uk.

Futaba Corp. of America; distributed by Great Planes Model Distributors; futaba-rc.com.

Great Planes Model Distributors (217) 398-6300; (800) 682-8948; greatplanes.com.

J-B Weld Co. (800) 784-8770; jbweld.net.

Model Graphics; distributed by Cajun R/C Specialties.

Nelson Hobby Specialties (877) 263-5766; nelsonhobby.com.

Officers and Gentlemen Box 537, RD 2, Hampton, NJ 08827.

O.S.; distributed by Great Planes Model Distributors; osengines.com.

Robart Mfg. (630) 584-7616; robart.com.

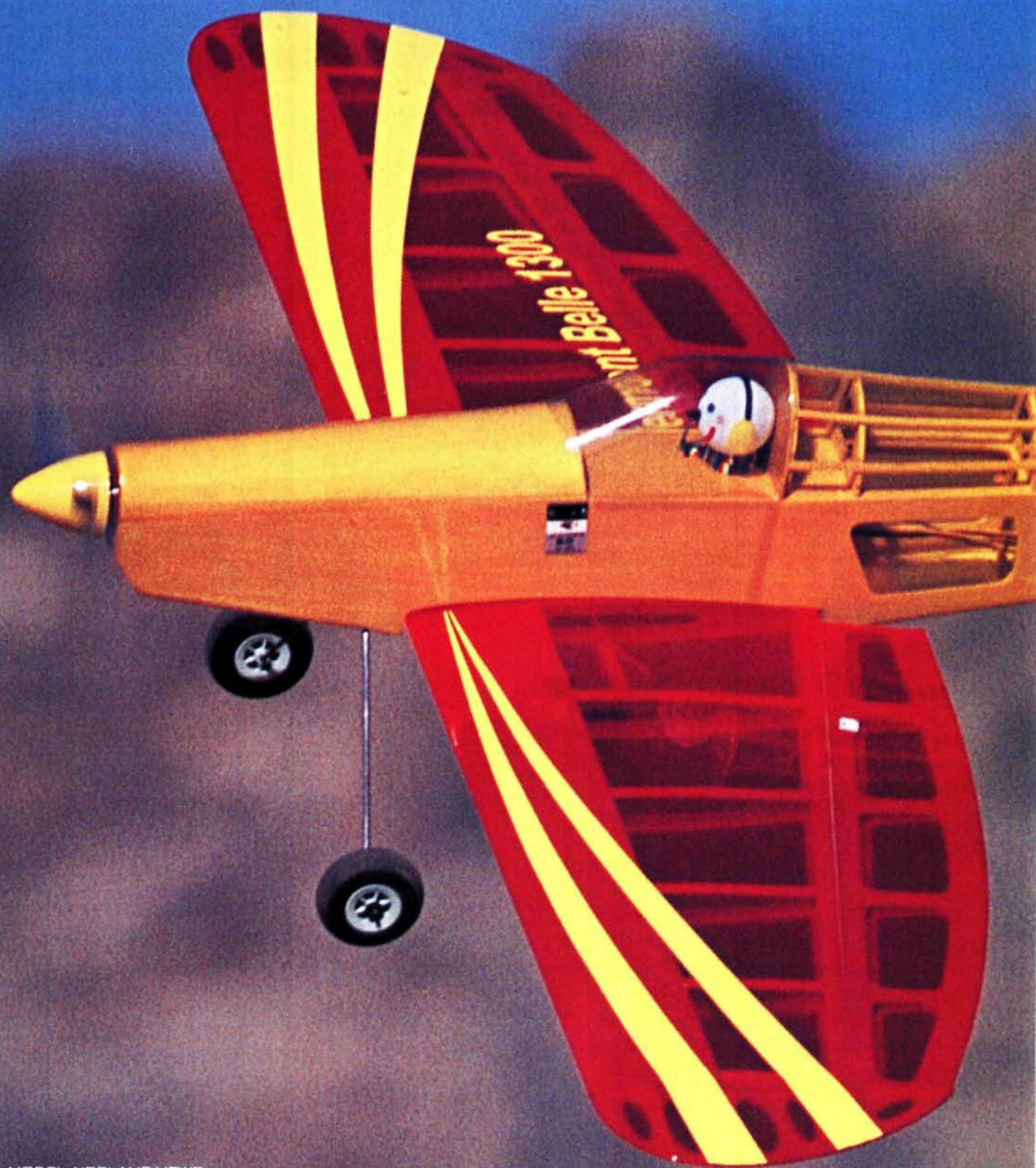
Sullivan Products (410) 732-3500; sullivanproducts.com.

UltraCote; distributed by Horizon Hobby Inc. (800) 338-4639; horizonhobby.com.

Zinger props; distributed by J&Z Products (310) 539-2313; zingerpropeller.com.

NORTHEAST SAILPLANE PRODUCTS

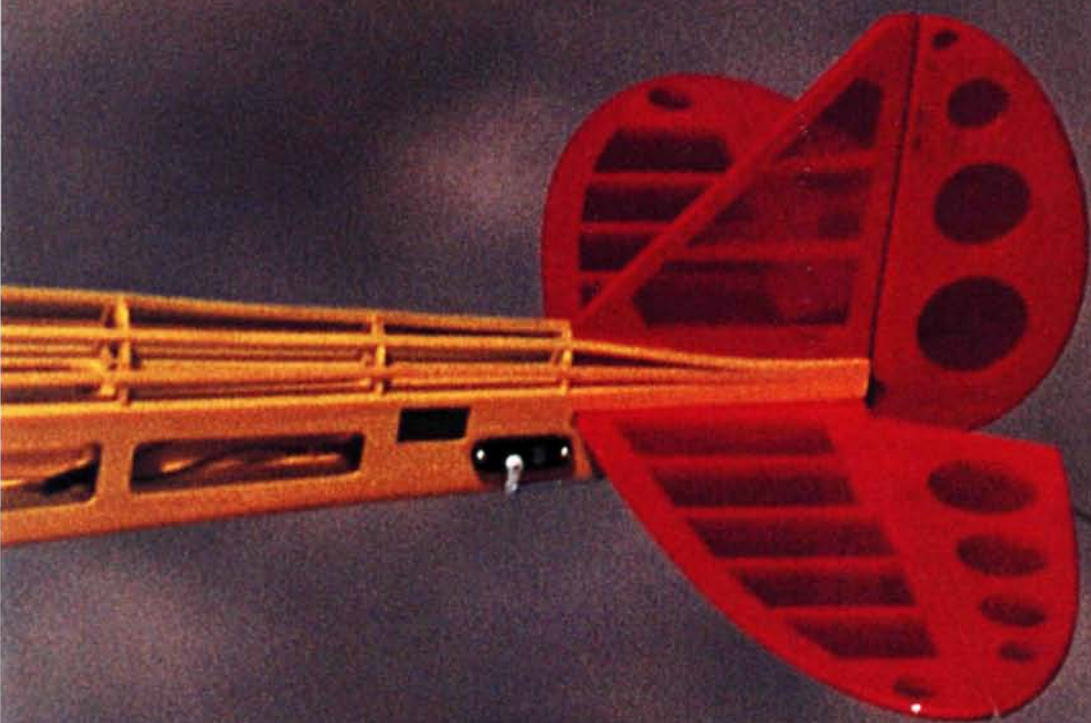
Vermont



Belle 1300

by Norm Bogenschild

Do you think an electric sport plane can perform as well as a gas-powered sport plane? Until I flew the Vermont Belle 1300 (manufactured by LN Models and distributed by Northeast Sailplane Products), my answer to that would have been "no," but this sport plane performs better than most planes—gas and electric. Its 3-foot takeoffs, power to hover and then climb vertically and control surfaces large enough for 3D maneuvers make the Vermont Belle a real blast to fly! If I could have only one sport plane, this ARF would be my pick.

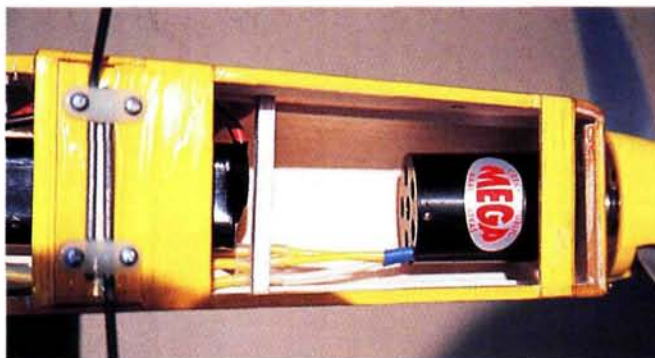


*Electric aerobat with
performance to spare!*



THE KIT

All of the pieces of the Vermont Belle 1300 almost-ready-fly (ARF) are covered with translucent yellow and red film. The ailerons, elevator and rudder are installed at the factory with tape hinges. Hardware, wire landing gear, a canopy and self-adhesive decals complete the kit.



The Vermont Belle allows easy access to the motor, and there's plenty of room in the nose to adjust the battery's position. With the battery in its final position, I glued an 1/8-inch hard-balsa bulkhead in front of and behind it.

ASSEMBLY

The Belle requires very little assembly to get it into the air; you need only align the wing with the fuselage, glue on the tail feathers and install the power system and radio gear. I assembled it in three leisurely evenings; the process requires a relatively large work surface because of the one-piece wing. The instructions are very clear and straightforward, so you don't have to spend time deciphering them.

First, I mounted the wing on the fuselage with a dowel in the front and a single wing bolt in the rear. A blind nut (for the wing bolt) must be fitted into the plywood mounting plate before the plate can be installed in the rear wing saddle. I then measured an equal distance from each wingtip to the rear of the fuselage to align the wing; I drilled one hole in the rear of the wing for the wing bolt.

After I attached the wing, I removed the covering from the slots to prepare the fuselage for the tail surfaces. The slot for the horizontal stabilizer was too short, so I had to lengthen it with a hobby knife—an easy fix. Because the rudder and elevator arrive

hinged, I installed their control horns before I glued them to the fuselage (with 5-minute epoxy). The control horns for the ailerons came next. Unfortunately, the supplied screws were too short to secure the ailerons. A quick trip to the hobby store for some 1-inch screws solved the problem. I trimmed

The Vermont Belle 1300 is undoubtedly the best plane I've ever flown.

the canopy to shape and used transparent tape to install it. The landing-gear installation required only a couple of nylon straps and four screws. The hardest part of the assembly was applying the long, thin decals to the wings; that job became a little easier after I had sprayed window cleaner on the wings. I positioned the decals and carefully squeezed out the air bubbles.

SPECIFICATIONS

MODEL: Vermont Belle 1300

MANUFACTURER: Northeast Sailplane Products

TYPE: electric aerobat

WINGSPAN: 51 in.

WING AREA: 535 sq. in.

WEIGHT: 45 oz.

WING LOADING: 12.1 oz./sq. ft.

MOTOR REQ'D: brushless

MOTOR USED: Mega 22/30/3 w/TMM 40 speed control

BATTERY USED: 10-cell, 1700mAh NiMH

RADIO REQ'D: 4-channel w/5 servos (ailerons, elevator, rudder, and throttle)

RADIO USED: Hitec Flash 5 w/4 Hitec HS85BB servos and an Electron 6 receiver

PROP USED: 12x6 APC

PRICE: \$189.95

FEATURES: built-up balsa construction; translucent covering; hardware and landing gear included.

COMMENTS: the Vermont Belle's incredibly light airframe allows amazing performance, making it suitable for advanced pilots. The extremely wide flight envelope allows the Belle to perform just about any aerobatic stunt you can dream up.

HITS

- Super light.
- Highly aerobic.
- Attractive design and color scheme.
- Easy to assemble.

MISSES

- Firewall needed reinforcement.
- Aileron control-horn hardware was too short.

RADIO INSTALLATION

Because there isn't any oily mess to contend with, all of the servos are mounted externally near the control surfaces. The elevator and rudder servos are mounted in the rear of the fuselage and require servo extensions to reach the receiver. The ailerons require one servo each and are connected to the receiver using a Y-harness. I used Hitec HS-85BB micros servos throughout. The Hitec Electron 6 receiver is attached to the fuselage with self-adhesive hook-and-loop fastener. The speed controller is equipped with a battery-eliminator circuit, so a flight-pack battery isn't required. Using my Hitec Flash 5 computer radio, I set up all of the control surfaces with the recommended deflection and

Wow! That about sums it up! The Vermont Belle 1300 will amaze you; its incredibly light airframe coupled with its direct-drive, brushless Mega motor's power allows the Belle to do things that I didn't think an electric aircraft could.

TAKEOFF AND LANDING

The Belle lifts off after about 3 feet and climbs straight up until you can't see it anymore. If you're really quick on the controls, it can be hand-launched vertically. It's a pleasure to land it; its elliptical wing allows it to slow down to about 15mph without tip-stalls. A slight headwind will allow you to land at almost zero ground speed.

HIGH-SPEED PERFORMANCE

The direct-drive power system and the 12x6 prop really get the Belle moving. I used a radar gun to confirm that it reached 75mph. Half-throttle settings keep it comfortably aloft and for longer. Roll rates at high speeds are incredible, and the very axial rolls require little down-elevator correction.

LOW-SPEED PERFORMANCE

The wing loading's 12.1 ounces per square foot make the Belle a joy at low speeds. Stalls are straight ahead, and the large control surfaces do a great job at low speeds.



AEROBATICS

This is where the Belle really shines. You name it, the Belle can do it: inverted flight, rolls, spins, loops, knife-edges. It does it all! It's capable of 3D flight, but the CG must be moved back slightly; a larger rudder adds control for slow maneuvers.

set the high rates with 45 degrees of deflection.

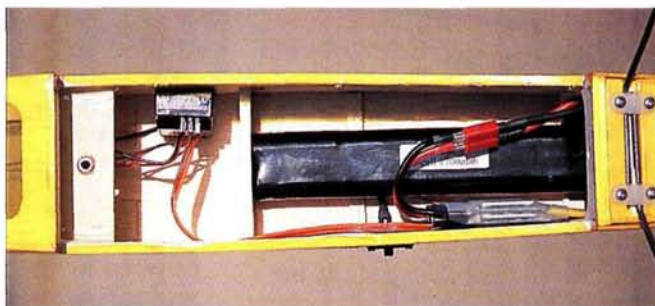
POWER SYSTEM

Several options are available to power the Vermont Belle; I purchased the direct-drive Mega brushless motor combination from Northeast Sailplanes. It included the Mega 22/30/3 motor, a TMM 40 speed control, an APC 12x6 prop, an aluminum prop adapter and a 1700mAh NiMH flight battery pack. Unfortunately, the prop adapter was slightly too small for the motor shaft (back to the hobby store I went!). The 5mm Graupner prop adapter that I picked up allowed me to use a spinner, which isn't included (or required), but it looks good! The holes in the firewall are properly spaced to accommodate the mounting screws. The instructions recommend that you check the airframe for poor glue joints when you assemble the plane. The 1/8-inch plywood firewall broke free of the fuselage sides while I was installing the motor, so I reinforced it with an additional piece of 1/8-inch plywood, which I epoxied into place. A fillet of epoxy and microballoons completed the firewall reinforcement.

I installed the speed control on the side of the fuselage with self-adhesive hook-and-loop fastener; I soldered the speed-control wires directly to the motor because this



Standard tail-surface hook-ups ensure smoothly moving controls. Because of the short pushrod hook-up to the servos, there is very little flexing and flutter. The steerable tailwheel provides positive control on the ground during takeoffs and landings.



There is plenty of space for the battery and easy access from the wing saddle and behind the firewall. I secured the 10-cell 1700mAh NiMH battery with a long piece of hook-and-loop fastener.

motor draws up to 45 amps when you use a 12x6 prop. This high amp draw prompted me to use Deans Ultra Connectors between the controller and the battery. Because the battery is the heaviest part of the aircraft, I positioned it to balance the Belle at the center of gravity (CG) specified in the manual. I installed 1/8-inch, hard-balsa bulkheads in front of and behind the battery. The bulkheads strengthen the 11-ounce airframe to prevent your hand from crushing the plane when you pick it up, and the bulkheads ensure that the battery doesn't move if the hook-and-loop fasteners that secure it come loose. This power combination allows

Alternative power systems

Although the Vermont Belle 1300 accepts a wide variety of power systems, a brushless motor is really the way to go because of its excellent power-to-weight ratio and high efficiency. On their website, the folks at Northeast Sailplane list several power combinations that provide performance comparable to that of the combination I chose.

I tried four battery packs with the direct-drive Mega system: a 10-cell, 1700 NiMH pack; a 10-cell, 1300 SCR Ni-Cd pack; an 8-cell, 1700 AU Ni-Cd pack; and a 16-cell, 1700 AU Ni-Cd pack. The NiMH pack performed best and provided 6 to 7 minutes of flight at high throttle. The longest flights were achieved with the 16-cell pack, but the plane's vertical performance suffered. The SCR pack provided performance comparable to that of the NiMH pack, but flights lasted only about 4 minutes. Last, the 8-cell pack provided only enough power to putt around for 4 to 5 minutes.

If you plan to do 3D maneuvers, go with a gear drive and a larger prop. Flight speeds will be lower, but the tail response will be more effective because of the increased prop blast. Keep the Belle's weight under 3 pounds, and you will love it.

6 minutes of flight at full throttle and nearly twice that at a lower power setting.

CONCLUSION

The Vermont Belle 1300 is undoubtedly the best plane I've ever flown. A few reinforcements added to the fuselage when you assemble it make the ultralight airframe capable of anything; Northeast Sailplane has done a great job! ✈

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.

Graupner; distributed by Hobby Lobby Intl. (615) 373-1444; graupner.com.

Hitec RCD Inc. (858) 748-6948; hitecrd.com.

Mega; distributed by Northeast Sailplane.

Northeast Sailplane Products (802) 655-7700; nesail.com.

TMM; distributed by Northeast Sailplane.

W. S. Deans Co. (714) 828-6494; wsdeans.com.

by Mark Rittinger

KI-61 TONY

An electric "Rising-Sun Warrior" of the South Pacific



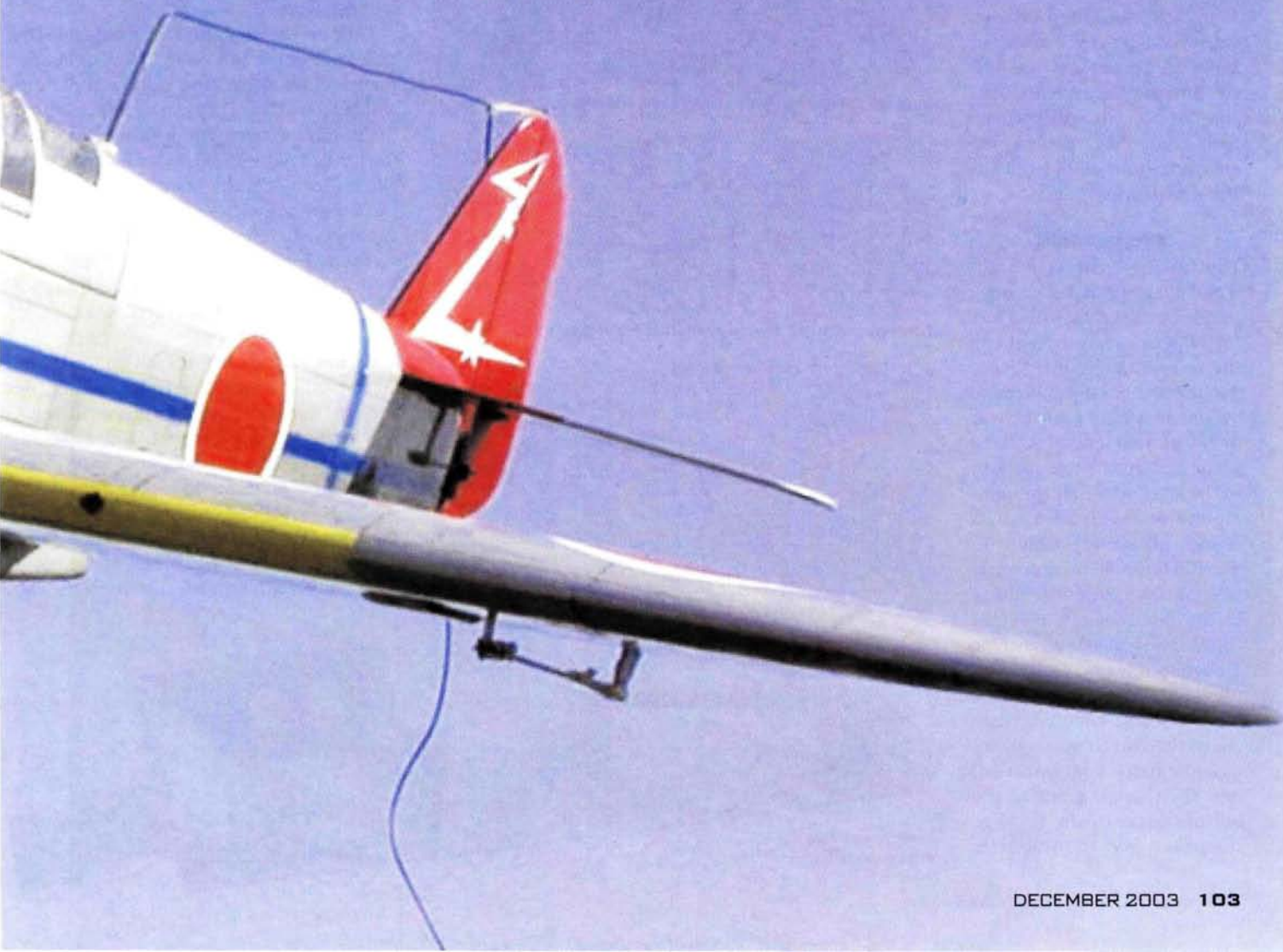
The Ki-61 Tony was a sleek-looking WW II Japanese fighter, powered with a Japanese copy of the Daimler in-line "V" engine. Fast and maneuverable, it was a formidable weapon used against the Allies. Modelers benefit from the many different and very brightly colored (easy to see) paint schemes that are available for the Tony.

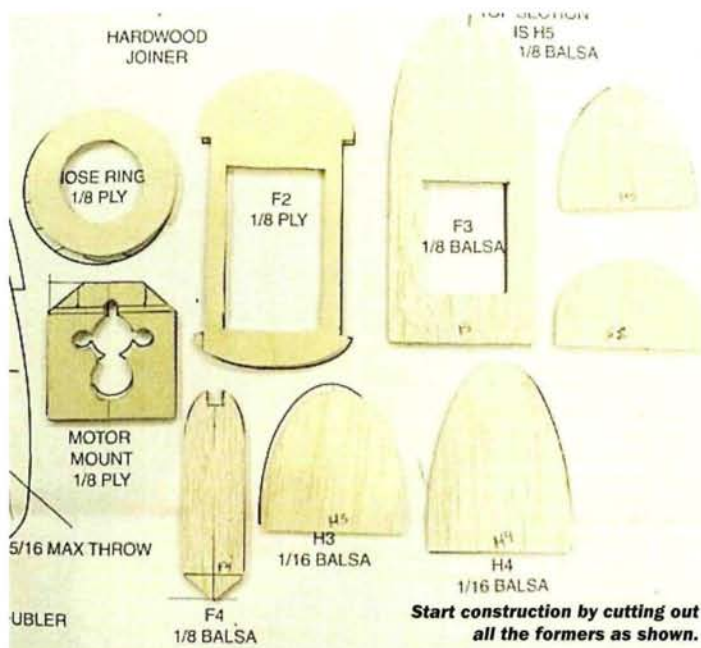
I have always liked this plane's clean, racy lines, and my simple, tried-and-true Magnetic Mayhem reverse-wind-motor setup is perfect for the Tony. The Tony is also a perfect companion for either my electric P-40 (featured in the June 2003 issue of *Model Airplane News*) or my P-51 (featured in the September 2002 issue), both of which are powered with the same low-cost, great-performing setup.

The construction is very simple and produces a strong, lightweight structure. The prototype was built and flown by my buddy Dave Ottney of New York, and he did a fine job; the model finished out at my target weight of 45 ounces. You can cut out your own wing-cores using a hot-wire cutter, or you could have the cores cut for you by a commercial foam cutter. Either way, the model goes together pretty quickly. There is no rudder, but if you want to add one, it isn't hard to add a movable one. Though not on the plans, retractable landing gear wouldn't be difficult to add either.



PHOTOS BY MARK BITTINGER





POWER REQUIREMENTS

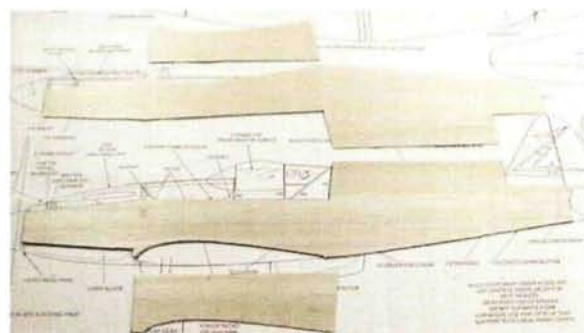
You don't need a brushless or even a cobalt motor to power this model, but since the prices for these are really coming down now, they might be worth a try. Several options for brushless power are out there: AXI, Jeti, AstroFlight, etc., direct drive or geared. As long as you get about 250 watts out of them, you'll be OK. Any 30A ESC with BEC suitable for 10 cells will perform well. As for "fuel," you can use anything from 800AR cells to 2000 NiMH cells.

CONSTRUCTION

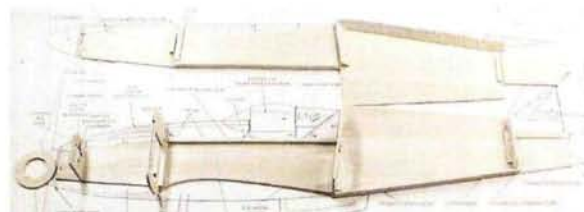
The fuselage. The Tony's all-wood fuselage is based on a simple box structure with a rear turtle deck. Begin by cutting the sides from $\frac{3}{32}$ -inch balsa. Avoid wood that would require a seam anywhere near the rear deck—it will crack. Cut to shape and attach the doublers to the sides. Make an appropriate motor mount; I used an $\frac{1}{8}$ -inch-ply mount. Glue it to one fuselage side using triangle stock, making sure it is square to the side. There is no right thrust, but you should include 3 degrees of downthrust. Add plywood former F2 and the balsa F3 to the same side, then attach the $\frac{1}{4}$ -inch square pieces near the hatch and former F2. Add the triangle stock to the bottom edges of the fuselage side, then add the stabilizer

doubler. Attach the second fuselage side and glue it to the formers and the motor mount. Pull the tail ends together and glue them together, then install F4. Make sure that the fuselage remains straight and true.

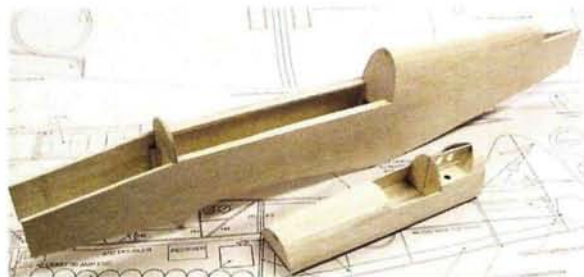
Add the $\frac{1}{4}$ -inch-square top rear longeron, and wet the outside of the deck sheeting to help bend it into place. I used medium CA to glue the sheeting into place while it was still wet. Mark the location, and cut



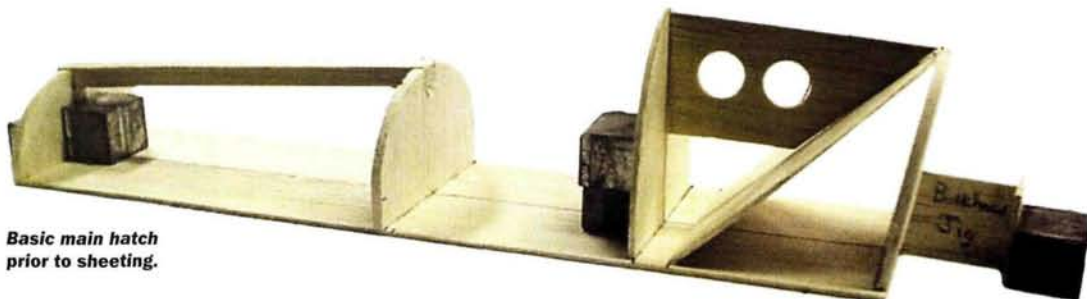
Here are the fuselage side sheets and the doublers.



Fuselage sides and doublers with formers added.



Basic fuselage structure shown with main hatch cover.



Basic main hatch prior to sheeting.

SPECIFICATIONS

MODEL: KI-61 Tony

TYPE: electric WW II Japanese fighter

WINGSPAN: 42 in.

WING AREA: 318 sq. in.

WEIGHT: 45 oz.

WING LOADING: 20.38 oz./sq. ft.

MOTOR USED: Kyosho Magnetic Mayhem reverse-wind motor with 3.5:1 Master Airscrew gearbox

RADIO REQ'D: 3- to 4-channel (elevator, aileron and throttle, optional rudder)

PROP USED: APC 12x10 E

COMMENTS: designed by Mark Rittinger, the KI-61 Tony is an easy-to-build balsa model with a foam-core wing. The parts count is minimal, and construction is straightforward and simple. Designed specifically around the author's standard Magnetic Mayhem/Master Airscrew gearbox power system, the Tony's performance is impressive. Other power systems can also be used but are not shown on the plans.

the other side to fit. By slightly pushing outward on the deck, you get a nice, full, rounded shape.

Glue on the nose ring, then tack-glue the nose blocks on and carve them to shape; then remove them, and hollow them out with a Moto-Tool. They can be built right on the fuselage for strength or made removable for access. I glued them on for a strong unit. On the Tony, a bottom hatch would be fine. Cut a cooling hole or two in the nose (the gun ports would work well).

The radiator scoop holds up surprisingly well when built up from balsa, though a solid block can be cut and carved also.

Main hatch. The hatch is built on top of the assembled fuselage. Begin by making the cockpit floor from $\frac{1}{16}$ -inch cross-grain balsa. Use former F2 as a template, and make the front piece of the hatch from $\frac{1}{8}$ -inch balsa. Cut $\frac{1}{16}$ inch off its top to allow for the hatch sheeting. Add all the other hatch formers and the hatch $\frac{1}{16}$ -inch balsa sheeting. Add some alignment pieces to the bottom of the hatch so it will fit straight on the fuselage. The

Let's hope you built a light, strong and straight model. If you have, and the CG is in the right place, the Tony will fly beautifully! The Tony has a good wing loading if it weighs less than 45 ounces.

TAKEOFF AND LANDING

Line up directly into the wind, and run the motor up to full rpm. Take a few steps, and give it a firm toss with its wings level and its nose at about 15 degrees upward. The Tony has a nice climb rate with 60 ounces of static thrust available. The model handles well at any speed, but landings can be a bit tricky with the cooling scoop on the bottom of the fuselage. To judge the sink rate, bring the model in for a test landing approach with enough power for a go-around. When landing, keep the speed up until you flare, and it will settle in very nicely.

LOW-SPEED PERFORMANCE

The Tony has decent performance when slowed down due to its light wing loading and the washout built into the wing. It will "mush" forward in a stall and then lose altitude until airspeed is regained. The Tony performs nicely with its scale control surfaces, contradicting the old idea that you have to enlarge them in models.

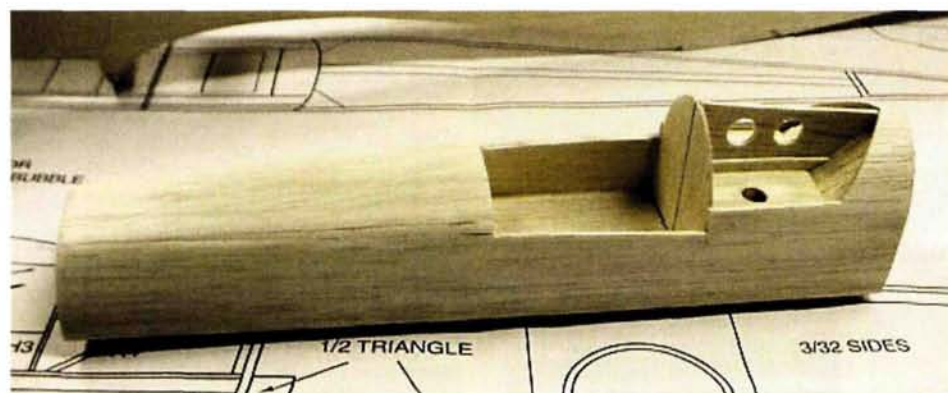
HIGH-SPEED FLIGHT

With the suggested setup, the Ki-61 flies at around 55mph at its top end. It tracks well and looks great in the air. It is by no means a racer, but it has good speed characteristics. Typically, flight duration with a 1250 SCR or 1300 CP pack is about 4 minutes. The 2000 NiMH cells work well, as do the 1700 CP cells, both adding to duration.



AEROBATICS

The model has good energy retention during aerobatic maneuvers and can perform any aileron and elevator moves. Rolls, split-Ss, Cubans-8s and Immelmann turns are all possible with the power setup suggested. Adding a rudder would increase the model's maneuverability, but I doubt that the real ship used it too much, other than during takeoff and landing.



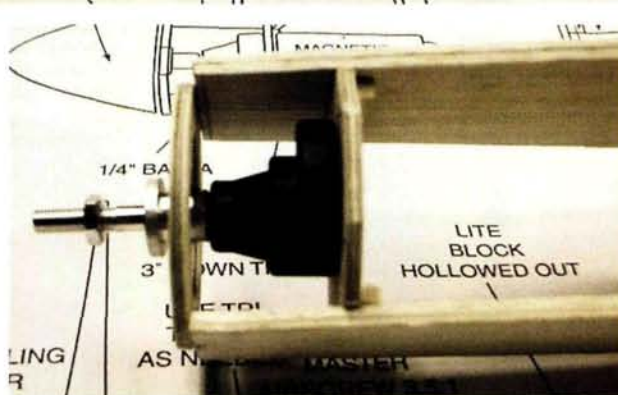
Main hatch cover with sheeting installed.

canopy on the prototype was homemade, but you can use the front part of a Sig WW II-style canopy and use flat acetate to form the rear section. I held my hatch in place with small "rare earth" magnets from RadioShack.

Tail surfaces. The fin, horizontal stabilizer, elevator and rudder are all made out of simple 1/8-inch-sheet balsa. Use flat, strong, lightweight wood. Attach the stabilizer to the fuselage, and then use a 90-degree triangle while attaching the fin. Add light, balsa filler pieces above the stabilizer, and cut the elevator halves to fit. I used a hardwood elevator joiner, and it worked well.

THE WING

Cut the wing of pink insulation foam from a home-supply store. Use the 2-inch-thick foam. Do not use white foam for wing-cores! There is a chance that the wing might fold if you use the 1/32-inch wing sheeting shown. After the cores have been cut, sand them lightly to remove the "fuzz," then cut out the



Master Airscrew gearbox attached to the firewall. The motor is attached to the gearbox sandwiching the firewall between them.

servo wells, the handhold and the grooves for your aileron servo wires. I taped the core beds to the table and then cut the 1/32-inch wing sheeting to fit. If you intend to use a brushless motor to power your model, I suggest you add some carbon-fiber strips or replace the sheeting with 1/16-inch balsa.

Coat the wing-core and the inside surfaces on the top and bottom wing sheeting with Dave Brown's Southern Sorghum contact cement, and allow it to dry. Once the cement has dried, press the wing-core on top of the bottom sheeting and then press the top sheeting on top of the core. Sand the root of the cores to the dihedral angle shown on the plans, and then glue on the balsa leading edges. Cut out the ailerons, and trim away the excess material to allow for the wood thickness where you will apply the leading and trailing edges and end sheeting. Add the wingtip blocks, then carve and sand them to shape. Trim the wing's center leading and trailing edges to fit in the wing saddle, then join the wing panels with epoxy and wrap them with glass cloth and resin. Make sure that the wing remains warp-free!

Glue the wing into place with epoxy while making sure it is straight and aligned with the tail surfaces. I wait to cover the wing until the model is completely built, but you can cover it now, if you like.

COVERING & FINISHING

Here you have many options. Since there are so many different color schemes, you can go a lot of ways. Be careful with high-temperature-application film on the wing, as the foam can swell if it

Lower nose block installed and shaped.





Basic parts for the scale exhaust stacks.

ESC as far from the motor as you can.

The prototype uses a Magnetic Mayhem reverse motor and a 3.5:1 550- to 600-size Master Airscrew gearbox. No motor-timing changes are needed. Do not forget to install all the capacitors to the motor and perform a "motor-on" range check before each

flight! I used an APC 12x10 "E" prop. You can use a 2.5-inch spinner from Sig Mfg. or Du-Bro.

Check the center of gravity (CG), and adjust the battery placement until you

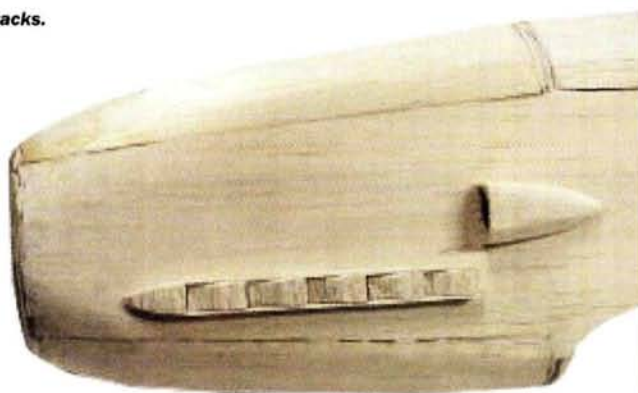
The Tony really is simple to build and doesn't take much time to complete!

gets too hot. Fiberglass cloth and finishing resin are also a good option. In the end, finish the model with whatever you feel most comfortable with—as long as it is very light. Major Decals has Japanese aircraft markings in the proper sizes.

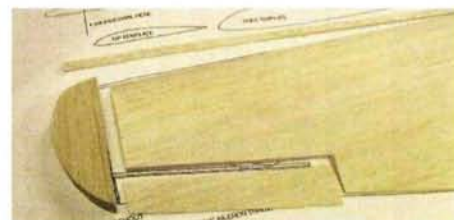
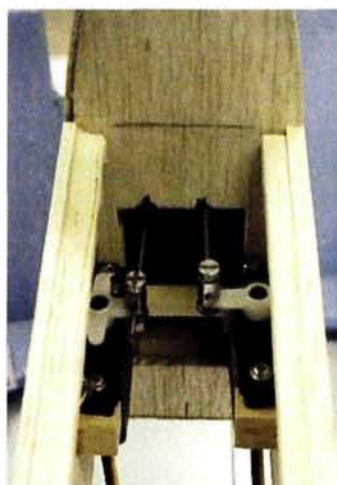
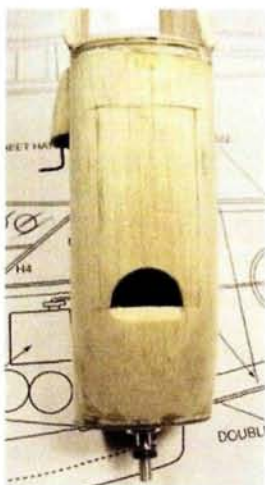
RADIO & FINAL SETUP

The Tony was designed around a 3-channel radio system using ailerons, elevator and throttle. Use servos that produce at least 20 ounces of torque. Use a 30A electronic speed control with BEC for 10 cells. The cells can be held in place with hook-and-loop fastener or double-sided tape. To prevent interference problems, place the

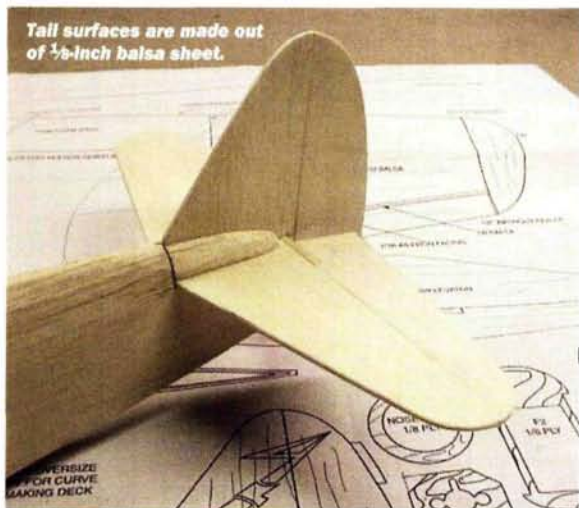
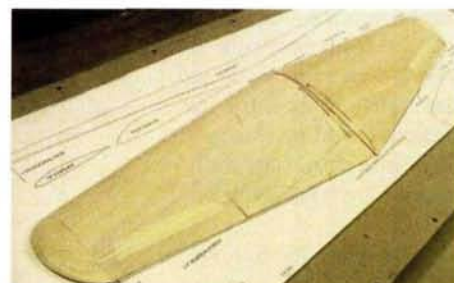
Right: air-cooling inlet formed in lower nose block. Far right: elevator and optional rudder-servo arrangement is straightforward and simple to install.



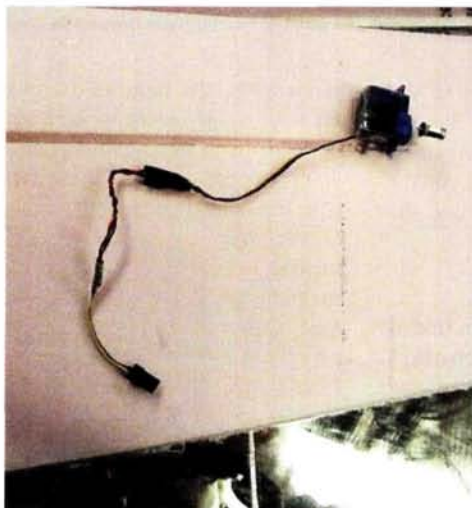
Nose section with exhaust stack and air scoop.



Above: here, the aileron has been cut from the wing panel. The wingtip is formed from a balsa block and attached after the aileron has been formed. Below: completed wing panels prior to joining. The wing root must be sanded to form the dihedral angle before the panels are glued together.



Tail surfaces are made out of 1/8-inch balsa sheet.

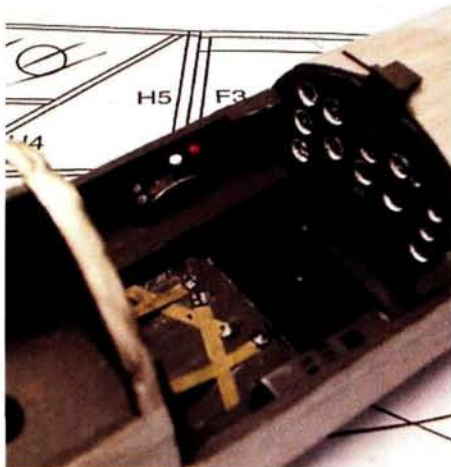


Left: basic foam wingcore cut from pink insulation foam. Notice the groove cut into the foam for the aileron servo lead. Above: cut the servo well into the wing panel so the servo fits tightly into place.

KI-61 TONY FSP1203A

Designed by Mark Rittinger, the KI-61 Tony is an easy-to-build balsa model with a foam-core wing. Minimal parts count; straightforward and simple construction. Designed specifically around the author's standard Magnetic Mayhem/Master Airscrew gearbox power system, the Tony's performance is impressive. Other power systems can be used but aren't shown on the plans.

Span: 42 in.; weight: 45 oz.; power: geared 550 to 600 electric motor; 1 sheet; LD: 2; \$19.95



Completed Tony ready for finishing.

Belly air scoop is formed from a balsa block and glued into place.

plete! I hope you have a good time building and flying yours. Good luck with your Tony!

If you need any help, I am available via email at mrittinger70@hotmail.com. ✈

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.

AstroFlight Inc. (310) 821-6242; astroflight.com.

AXI and Jeti; distributed by Hobby Lobby Intl. (615) 373-1444; hobby-lobby.com.

Du-Bro Products (800) 848-9411; dubro.com.

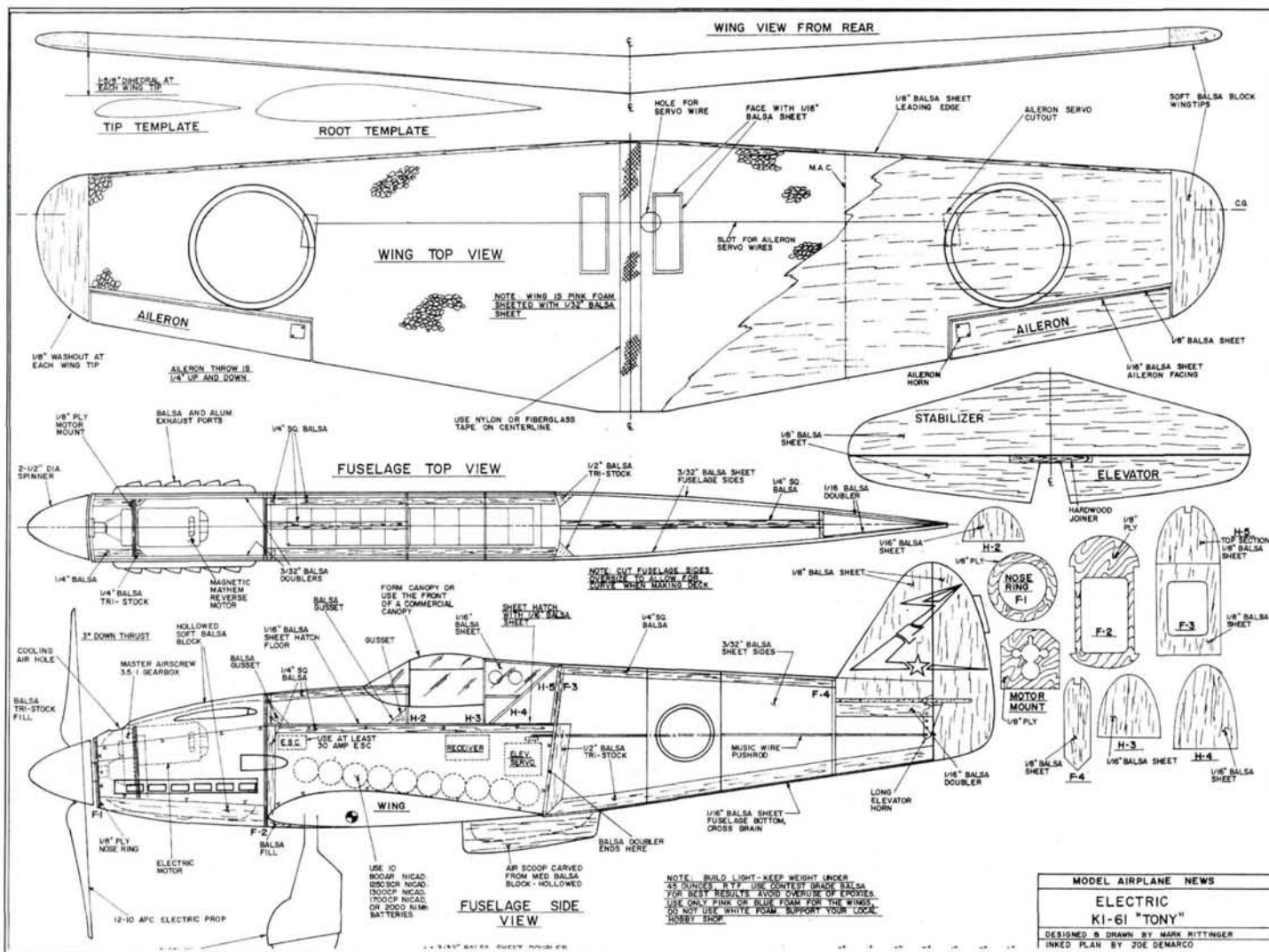
Magnetic Mayhem by Kyosho; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; kyosho.com.

Major Decals; distributed by Northeast Screen Graphics (413) 525-7465; majordecals.com.

Master Airscrew; distributed by Windsor Propeller Co. (916) 631-8385; masterairscrew.com.

Sig Mfg. Co. Inc. (800) 247-5008 (641) 623-5154; sigmfg.com.

Southern Sorghum; distributed by Dave Brown Products Inc. (513) 738-1576; dubro.com.



To order the full-size plan, turn to page 164, or visit rcstore.com online.

A riveting skill

The goal of most serious scale aircraft modelers is to produce the illusion that their creation could—given the proper setting—be mistaken for its full-size counterpart. To achieve this objective, many elements of the modeling job must be completed correctly, and in my opinion, their order of importance is as follows:

1. Correct scale outline and cross-sections
2. Craftsmanship
3. Detailed landing gear and wheels of the correct size
4. Correct true-to-scale paint job
5. Scale engine and prop
6. Scale pilot
7. Scale surface detail

If you get just the first four elements right, you'll have a good chance of winning some contests. But if it's possible to obtain glory without worrying about rivets—included in the last step on the list—then why bother? Why, for the wow! factor, of course.

Properly made, scale rivets can be the most impressive features of an already excellent model. At most competitions, models are judged from distances at which rivet detail isn't visible, so the extra time it takes to produce rivets must be a sacrifice made to achieve personal satisfaction. It's very gratifying to know that your creation looks even more genuine up close than it does from far away, and this knowledge can be a source of real pride to a modeler.

In this article, I discuss raised rivets—the half-dome “pimples” that often cover most of the metal surfaces of many older aircraft. Keep in mind, however, that on some projects, it's better not to duplicate the rivets. Many plastic models of the 1950s and '60s attempted raised-surface detail on 1/2-scale and smaller aircraft, and this type of detail made it look as if the full-size subject were made out of boiler-plate. If you aren't careful, this same undesirable effect can happen on an RC aircraft. The larger the scale of the model, the more important the rivets become for authenticity.

I'm aware of two methods that have long been used to make raised rivets. In both, you apply droplets of a white or aliphatic-resin glue

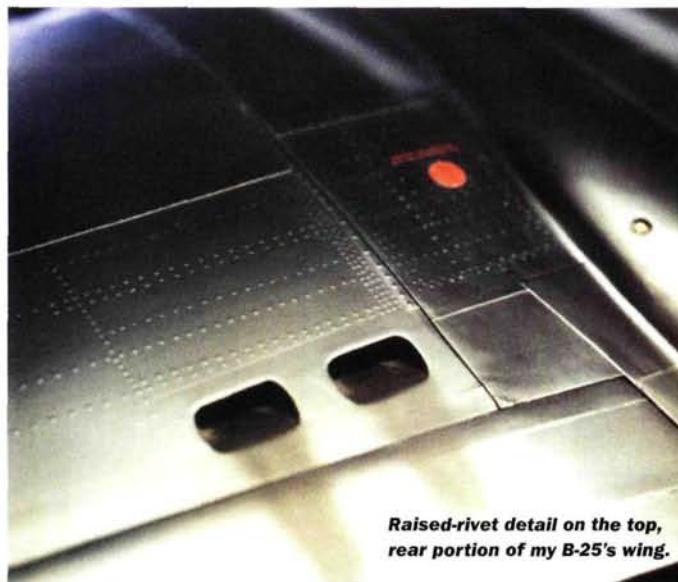


to the surface. In one method, you use a needle-type applicator to dispense the glue; in the other, you dip a toothpick into the glue and then touch it to the aircraft's surface. I experimented with both techniques and found advantages to each but one common problem: I did not have the patience to achieve the necessary consistency in the rivets' size and shape. The needle applicator's fine metal tube created very small drops of glue—but not every time. I was not able to see the glue flow through the tube, so it was hard to know how much pressure to apply when I

squeezed the glue bottle and exactly how long to reduce the pressure to ensure that the smallest drop possible stayed on the end of the tube before I touched it to the model's surface. I found that I achieved better consistency with the transparent, extra-fine extender tips. I bought empty, 1-ounce CA bottles at my hobby shop, filled them with aliphatic resin and attached the tips to them. Being able to see the glue flow through the tube makes a big difference.

For the best results with this method, only the drop of glue should touch the model's surface. When the tube's tip touches the surface, it tends to flatten out the rivet and enlarge

it. After “dripping” several hundred rivets, I found this method very tiring. Furthermore, producing 19 “good” rivets out of 20 was about the best I could do. It's time-consuming to remove the one bad one (though I found that a fresh cotton swab worked well for this); most of the time, I accidentally



Raised-rivet detail on the top, rear portion of my B-25's wing.

touched—and ruined—the other good rivets. After my experiment, I wasn't looking forward to applying thousands of rivets.

I tried the toothpick method and found it easier, but I couldn't consistently get the rivets small enough to be $\frac{1}{10}$ scale. Moreover, I had to hold the toothpick perpendicular to the surface to get good results. I had decided to use the needle-applicator method when my wife came to the rescue!

A CRAFTY IDEA

When my wife does craftwork, she uses a tool called a stylus to place dots of paint on, for example, the eyes of very small dolls. A stylus is basically a wooden dowel; each end has a 1-inch steel rod that tapers almost to a needle-point. What distinguishes it from a double-ended ice pick are the two miniature spheres machined into each end. When either end is dipped into glue and then touched to a surface, it leaves a virtually perfect round glue dot that comes out the same size almost every time. It can be held like a pencil.

The beauty of this method is that the end of the tool can touch the model surface and still produce a small "rivet." The tool can also be allowed to touch the surface at an angle, so the palm of your hand can rest on the model's surface as you hold the stylus, just as when you hold a pen. This increases the accuracy of the rivets' placement and greatly decreases the fatigue factor. You can create thousands of rivets at one sitting without going crazy!

Adding the rivets to the model's surface should be the last step

before you begin painting. The surface should first be primed and finish-sanded. Using a very soft-lead pencil and a flexible straightedge, draw the lines on the aircraft surface wherever you want to place the rivets. I found that a clear plastic straightedge designed for use with fabric was very helpful; it has many lines imprinted on it that run parallel and perpendicular to its edge. This is a great help in maintaining the correct alignment of your lines.

A close-up picture of the full-size aircraft can be very helpful at this point, as can one of the high-quality, $\frac{1}{48}$ -scale (or larger) plastic models available in hobby shops. The manufacturers of these models work extremely hard to ensure their accuracy, so why

Making all your rivets the same size is easy with the stylus technique. It's important to center each one on your pencil line; a zigzag line of rivets is more obvious than unevenly spaced rivets.

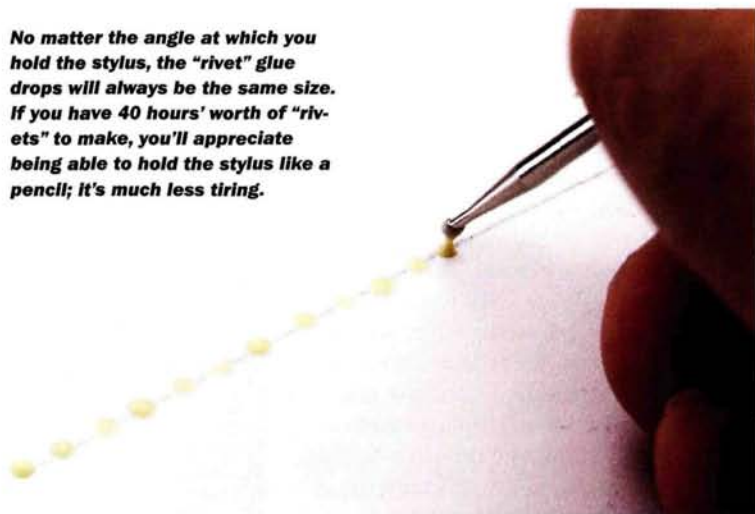


not take advantage of it? They usually show the placement of every panel line on an aircraft, and wherever sheets of metal meet, there will be a line of rivets.

I have found that officially approved 3-views often leave a lot to be desired as references for rivet placement. Their rivet lines are drawn with the assumption that bulkheads and ribs are evenly spaced and symmetrical, but a little research usually shows that this isn't the case. The lines have to be drawn anyway; why not take a little extra time to make them as close to perfect as you can? "Close to" are the key words here; you can ignore the sticklers who tell you that your lines are $\frac{1}{4}$ inch off.

I used a ruler to place the first rivets on my PBJ (B-25) as evenly and as close to the rivet line as I could. After two minutes, I was ready to abandon the whole idea of rivets. If I managed to space them evenly, I usually couldn't keep them on the line. Then the ruler would slip and wipe out six rivets. I discarded the ruler and just estimated the spacing.

No matter the angle at which you hold the stylus, the "rivet" glue drops will always be the same size. If you have 40 hours' worth of "rivets" to make, you'll appreciate being able to hold the stylus like a pencil; it's much less tiring.



It wasn't perfect, but it was more than good enough. The important thing is to center each rivet on your pencil line. A zigzag alignment stands out much more than uneven spacing.

For authenticity, you should not make the distances between the lines of rivets all the same. Wherever rivets are used to join sheet-metal panels, the rivet count is almost double that of where rivets are used to attach the sheeting only to bulkheads, longerons and ribs. High-



Everything you need to make perfect "rivets" is right here. If you have two styluses of different sizes, you'll be able to make scale rivets of various sizes. Use the Titebond II glue at full strength or thinned with water.



A $\frac{1}{4}$ -inch-wide bead of glue on an old playing card is just the right amount of glue to be used up before it starts to form a skin.



rotisserie-type methods to hold this assembly on its side before I came across a rectangular cardboard box that I lined with bubble wrap. It served as an adequate cradle to position the aircraft stably on its side.

When all the rivets are in place, it's time to paint. I had nightmares about the paint going on so thickly that it would wash out all the surface detail. But this wasn't a problem with Chevron Perfect Paint military colors. A very light coat yielded excellent coverage with no loss of rivet detail. Luckily, the paint ran only slightly in two places. This is something you must be very careful to avoid. You can remove a major run in the paint only by sanding it down, and this will also remove all the rivet detail in the area. The rivets must then be reapplied and the area repainted. It's actually better to repaint a larger area than seems

The raised rivets on the PBJ's fuselage (left) and fin/rudder (below) really augment its authentic look.

necessary so the borders of the "repair" are formed by existing panel lines. This ensures that the refinishing will be virtually undetectable.

There are raised rivets on the fuselage and the top of the wing rearward from 30 percent of the wing chord. The PBJ's forward fuselage and wing were manufactured by North American Aviation (NAA) using flush rivets. NAA engineers realized that the airflow over the rear portions of the aircraft would already be turbulent and that raised rivets in these areas would not significantly increase the aerodynamic drag. The use of raised rivets decreases manufacturing time and cost, and this was extremely important during WW II.

Flush rivets are pretty much the norm for most modern aircraft. Raised rivets are a thing of the past for most Western aircraft. If you build a MiG-29, however, this article will be helpful. The Soviets were never known to give cosmetic details much priority. When their engineers designed the Fulcrum, they came to the same conclusion as NAA designers had more than 60 years earlier: raised rivets on

stress areas sometimes have double or even triple rows of rivets, and spaces between the rivets along any one line should be the same, although varying the spaces between the lines gives a more realistic look. Three different spacing patterns suffice for most aircraft.

I used Titebond-II for my rivets. It dries quickly enough (after 20 minutes or less) to prevent your accidentally smearing many of the previously applied rivets (this can still happen from time to time, though). At full strength, however, the glue rivets were too prominent. I made 95 percent of the rivets on my 1/10-scale PBJ with the glue diluted 4:1 with water to soften them. For rivets that attach reinforcing panels, I used the glue full strength. I used the larger end of the stylus to simulate the Dzus fasteners on fairings, and I also used the glue full strength to simulate the large screws that attach the outer wing panels. Modelers who know the B-25 may say that the outer panels are attached with large nuts. This is true of the aircraft as it was modified for use by the Air Force in the 1950s, but as manufactured in WW II, the wing panels used large Phillips-head screws.

I ran a 1/4-inch-wide bead of glue on an old playing card that I use as my glue palette for dipping the tip of the stylus. I can use up most of the glue before it begins to form a skin. One dip produces one rivet. After I have formed a dozen, I wipe the stylus clean with a paper towel and begin again. The horizontal rows of rivets are made top to bottom, and the vertical rows are formed in sections as each horizontal row is completed. The rivets cannot be placed on a surface that has a slope of more than 45 degrees because the glue will run; therefore, the fuselage must be "riveted" in four sections: top, two sides and bottom. I built my PBJ with the wing's center section and nacelles permanently attached to the fuselage. I considered a few



some rear portions of aircraft incur an insignificant aerodynamic penalty. NAA engineers used the same philosophy on another of their later designs: the OV-10 Bronco.

I decided not to attempt to duplicate the flush rivets on my PBJ because I had come to the conclusion that flush rivets virtually disappear at 1/10 scale when you try to reproduce a painted metal surface. The desired effect is too subtle to be worth the effort, and the rivets could easily become too prominent. At larger scales, of course, you can duplicate flush rivets using a sharpened brass tube attached to a soldering gun.

Without a stylus, I probably wouldn't consider undertaking an extensive rivet project again. With it, though, I wouldn't hesitate. My hand never became fatigued, and the entire process took less than 40 hours. The result is primarily for my own satisfaction and pride, so the extra effort is well worth it. ✦

Saito FA-40a

4-stroke sound & 2-stroke power

Well, they've done it again! As expansive as the Saito line of engines is, the folks at Horizon are constantly working to fill any gaps in the engine-displacement lineup. Their new .40 4-stroke fills the slot between the .30 and the .50-size engines and provides an additional option for .30 to .50-size planes. In addition to offering a complete line of 4-stroke engines, the Horizon engineers also raise the power-to-weight ratios of each new engine. They did it well with the FA-100 that I reviewed in March 2003 in *Model Airplane News*, and they now have a similar power-to-weight-ratio success with the new FA-40a.

The FA-40a has nearly the same mounting dimensions as the FA-30, so the larger engine can easily replace a .30 in an existing model with a little rework. This isn't a bored-out .30; the dimensions and specs of this new design fall between those of the .30 and .50. With a power increase of 30 percent more than the .30, but a weight increase of only 15 percent, the 40a boasts quite a power-to-weight-ratio improvement!

I was curious what the "a" in 40a represents, so I asked. Horizon says it's just a revision letter from the development process and doesn't have any real significance for the modeler.

NOT JUST ANOTHER PRETTY FACE

I tested the FA-40a GK (Golden Knight) version for this review and wanted to know what the difference (if any) in engine performance would be with a black finish. After intensive research (one phone call to one of Horizon's helpful specialists), I confirmed my suspicion: the pretty black and gold finish gives an aesthetic advantage only. It's nice that Horizon continues to offer modelers a choice.

FEATURES OF NOTE

The engine incorporates the new cam housing design of other recent releases, such as the FA-100. Horizon says this weight savings contributes to the improved power-to-weight ratio. In addition, the crankcase vent is now in the side of the cam housing. This change increases lubrication of the cam, bearings, shaft and the valve lifters. Saito uses bronze bushings riding on a steel shaft for cam support as a general feature, whereas other brands, to my knowledge, use ball bearings. Both designs require good lubrication.

Another feature I've noticed in recently released engines is the location of the muffler pressure fitting near the outlet end of the muffler. That isn't a big deal, but the pressure hose is now visibly exposed and out in the airstream. I suspect that

the designers used the pressure fitting to help retain the end plug and to take advantage of the muffler's



extra thickness

near the outlet to help

secure the fitting. One advantage of this

location for the pressure fitting is that the modeler has

easy access for removing the vent line during refueling. I would consider moving it near the inlet and then installing a screw plug in the vacant hole or replacing the fitting with one of a right-angle design. Modelers just have to mess with things, you know!

The FA-40a muffler elbow is interesting. You can use it in a variety of positions and angles depending on engine-compartment space. I would have liked to see wrenching flats on the muffler body to aid in tightening the muffler to the elbow or engine. To prevent gouging, I used pliers with a soft piece of aluminum flashing wrapped around the muffler end.

Most props in this size range will fit the 1/4-inch prop shaft, and that eliminates the need for reaming out or shimming props. The double-locking prop nut, usually found on larger 4-stroke engines, is a great safety feature on the FA-40a.

Other high-value design features include the AAC construction (aluminum piston, aluminum cylinder, chromed cylinder) and the one-piece head/cylinder.

APPLICATIONS

Any model that can be powered by a .20 to .40 2-stroke engine might be a good candidate for

SPECIFICATIONS

ENGINE: FA-40a GK
MANUFACTURER: Saito
DISTRIBUTOR: Horizon Hobby Inc.
WARRANTY: 3 yr.
DISPLACEMENT: .40ci (6.6cc)
BORE: 22mm
STROKE: 17.4mm
LISTED OUTPUT: 0.65hp
PRACTICAL RPM RANGE: 2,000 to 12,000 (static)
WEIGHT: 300g/10.58 oz. w/muffler (my sample: 305g/10.76 oz.)
WIDTH: 1.77 in. (45mm)
LENGTH: 3.46 in. (88mm)
SHAFT DIAMETER: 1/4 in., 1/4 -28 thread
PROP: APC 10x5 to 12x6
FUEL: Cool Power 15%
PRICE: \$194.99 (FA-40a GK), \$179.99 (FA-40a)

HITS

- High power-to-weight ratio.
- Only slightly larger than the FA-30.
- Good idle and transition.
- A.A.C. construction and single-piece head/cylinder design.
- Muffler elbow design.
- 1/4-in. prop shaft and double prop nut.

MISSES

- Carburetor isn't reversible.
- Pressure fitting is inconveniently located.
- No wrenching flats on muffler.

PROP PERFORMANCE

PROP	PEAK RPM*	LOWEST IDLE RPM**
APC 10.5x6	10,200	2,000
APC 10x7	10,600	2,100
APC 11x5	10,100	1,900
APC 11x6	9,500	1,900

This data was obtained with Cool Power 15-percent nitro, 20-percent all-synthetic-oil fuel and an O.S. "F" plug.

* Never fly at peak rpm; back off 200 to 300rpm on the rich side of peak.

** After adjusting the low-speed mixture for the lowest possible idle, as a safety margin for flight, raise the idle rpm 200 to 300rpm with the transmitter trim.

The 1/4-inch prop shaft on the FA-40a; its diameter fits most props in the .40 range, and this eliminates the need to ream out the prop holes. The double-locking nuts are a great safety feature (usually found on the larger engines).



The muffler elbow joint can be adjusted to a variety of positions to match your engine-compartment space. Notice that the muffler pressure fitting is now at the muffler's outlet end. This allows easy access to the vent line when you want to remove it to refuel.



The new cam housing is a recent design change for the Saito line; it contributes to the FA-40a's overall lighter weight and increases its power-to-weight ratio.

BREAK-IN AND BENCH TESTING

To summarize the break-in procedure given in the manual, you shouldn't exceed 4,000rpm during the first 10 minutes of operation. After that, gradually lean it out with each tank of fuel, and always maintain a rich mixture until you've accrued 40 minutes of run time. This worked well, and after this regimen, my test engine held full power without slowing down or becoming overheated. Then, as instructed, I moved the idle needle to the setting that produced an excellent idle and transition to high speed. The owner's manual gives detailed break-in procedures for both bench and flight break-in methods, so it's always a good idea to read and follow the instructions for the break-in method you choose.

The manual recommends a fuel nitro content of 10 to 15 percent. I like 15 percent because I've found through the years that I can run just about any glow engine on that nitro fuel ratio with little compromise in

the FA-40a. One of Horizon's product specialists suggested that Lanier's .25 Extra would be a good match. Most kit and ARF specs give both the 2-stroke and the 4-stroke engine size recommendations, and it is always best to go by the plane manufacturer's recommendation.

The smallest plane in my stable is a Sig Four-Star 40. I tried the FA-40a in it to see how it performs (see the "Flight Test" sidebar), but for now, let's do some break-in runs on the test stand and get to know the new kid.

FLIGHT TEST

I installed the FA-40a in a well-worn Sig Four-Star 40 and attached an APC 11x5 prop. This plane has hosted about six engines in its long life, and it's showing signs of stress with the many cheek cowl cutouts. I filled the tank with Cool Power 15-percent-nitro fuel, and the plane weighed 5.4 pounds ready to fly.

Du-Bro threaded brass inserts are installed on the front of the firewall, and I used them to secure the engine rather than using the blind nuts that are installed from the back. With this setup, I don't have to remove the tank when I fit a new engine for testing, however, with so many inserts, the firewall does look like Swiss cheese.

Takeoff on thick grass took only slightly longer than the other engines I have tested in the Four-Star 40, and the climb-out was moderate and stable. As my confidence in the engine increased, I gradually upped the flight load with aerobatics that included inside and outside loops, snaps, inverted flight and then the supreme test: knife-edge and hover. The knife-edge was brief; I could hold it for only about 100 feet before the plane began to lose altitude, and the hover quickly ended up in a tailslide.

For about 15 minutes, I shot many approaches at a dead low idle, made touch-and-go's, inverted approaches and flybys, all with instant throttle response for a reliable climb-out. This was just pure fun! I tried to force the engine to falter with a lower and lower idle and then snapping the stick to full throttle, but it was solid all the way. For the second flight I had to land and taxi in the rain, but during both flights, the Saito FA-40a earned my respect.

Now I call it the "little engine that could." The Saito FA-40a delivered a solid performance that would certainly satisfy the first-time low-wing flier and even many all-around sport fliers who are just getting into aerobatics.

THE SAITO .30, .40 AND .50 LINEUP

The FA-40a doesn't fit the same mount as the FA-30; it has a slightly larger mounting-bolt pattern. This engine isn't a remake of an existing product; the dimensions of its new design fall between those of the .30 and the .50.

Here's a comparison of the major specs of the .30, .40, and .50 from the manual (note the high power-to-weight ratio of the new .40).

ENGINE	.30	.40	.50
DISTANCE, PROP DRIVE HUB TO BACK OF CARB (IN.)	3.35	3.46	4.10
OVERALL HEIGHT (IN.)	3.46	3.66	4.10
OVERALL WIDTH (IN.)	1.69	1.77	2.13
WEIGHT W/ MUFFLER (OZ.)	9.17	10.58	15.34
POWER (HP)	0.50	0.65	0.85
POWER-TO-WEIGHT RATIO (HP/LB.)	0.87	0.98	0.89
TYPICAL SPORT PROP	10x5	11x6	12x6

performance. With so many different models in my fleet, I like the convenience! Although this works well for me, I encourage you to use the type of fuel recommended by the manufacturer of the specific engine.

CONCLUSION

Since the new .40 falls between the existing .30 and .50-size engines, the increment in power choices is narrowed again. The 40a's high power-to-weight ratio makes it an attractive choice for those who like the option of installing more power without a weight penalty in a model that's designed to use a .30-size 4-stroke. I found this engine generally easy to start and adjust, user friendly and without bad habits or surprises—just like its larger stablemates in the Saito line.

The new FA-40a reflects the continuing evolution and refinement of Saito's basic design, and it incorporates years of design refinements and continues the line's tradition of high quality and value. If you install and adjust this engine properly, you will never be hassled by deadstick landings and, as a bonus, you'll get that great 4-stroke sound from a small package! ✚

APC Props; distributed by Landing Products (530) 661-0399; apcprop.com.

Cool Power; distributed by Morgan Fuel (800) 633-7556; morganfuel.com.

Du-Bro Products (800) 848-9411; dubro.com.

Lanier RC (770) 532-6401; lanierrc.com.

Saito; distributed by Horizon Hobby Distributors (800) 338-4639; saitoengines.com.

Sig Mfg. Co. (800) 247-5008; sigmfg.com.

A million ways to mount a motor

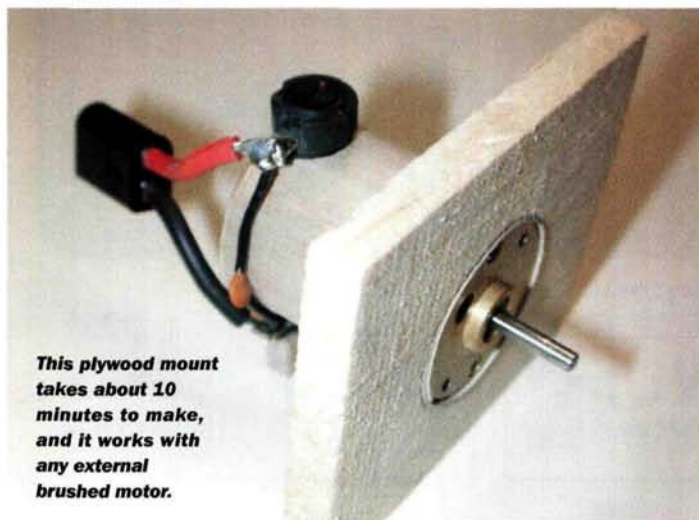
"What's the best way to mount a motor?" I've been asked this question many times, and my answer is always "Whatever works!" I don't mean to be flippant, but that really is the best answer. A mount or mounting method that is perfect for every application simply does not exist. Recently, motor manufacturers have become more aware of the dilemma, and they've begun to take modelers' concerns into consideration during the design process. Several companies produce aftermarket mounts that can simply be bolted into place, and those time-tested methods of making homemade mounts continue to work well. This month, we look at several of these mounting options.

HOMEMADE MOUNTS

Making a mount can be as simple as drilling matching holes in a firewall or custom-forming very thin plywood to match the shape of your motor. The latter method accommodates motors with



This is everything you will need to make your own mount. Cut the recess for the brushes in the tube and glue the tube into the firewall. The motor just rests in the tube, and the recesses hold the brushes to prevent the motor from turning.



This plywood mount takes about 10 minutes to make, and it works with any external brushed motor.



Homemade cradle mounts consist of a bottom plate, two triangle-stock pieces, sandpaper to prevent the motor from turning and two inner Nyrod pieces cut shorter than the motor's circumference. A couple of 2-56 screws hold it all together.



The Sonic-Tronics mount can be adjusted to fit a lot of motors and uses either a zip-tie or a metal hose clamp to hold it in place.

external brushes extremely well. I use these mounts regularly with my AstroFlight cobalt motors. They take only a few minutes to make, and though some modelers have voiced concern that such mounts retain heat by insulating the motor, I've never had a heat-related motor failure when using one.

Another homemade mounting method involves cutting a cradle base plate to fit the motor's radius and using straps or bands to hold the motor in place. I make my cradles with a plywood base and use two pieces of triangle stock to form the cradle. I use short lengths of inner Nyrod tubing attached to a 2-56 bolt that's threaded under the cradle platform to hold the motor securely. To tighten the tubes, simply tighten the bolt. This type of mount works best with small motors (Speed 600 and smaller).

BEAM AND CLAMP

This is another method that you can design yourself, but commercial versions are also available. A beam-and-clamp mount consists of hardwood rails (made of balsa dowels or spruce rod) that extend from a base and are just far enough apart to allow the motor to rest between them. Most modelers use hose clamps to secure the motor to the beams.

Sonic-Tronics makes an adjustable beam mount that can be bolted to the firewall and uses a zip-tie to hold the motor. A metal tab on the zip-tie protects it from the motor heat. The zip-tie is critical to the success of this method; if you use a cheap zip-tie, your motor will come loose. For peace of mind, I replaced mine with a metal hose clamp.

CLAMSHELL MOUNT

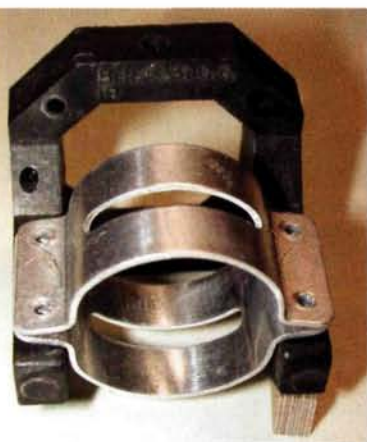
Similar to the beam and clamp mount, a clamshell mount has beams that extend from a base. Here, however, the motor sits in a small metal cradle that rests between the beams instead of on the beams themselves. A matching metal cradle sits over the motor, and screws on both sides join the two pieces and secure the motor. Hobby Lobby and New Creations R/C both offer some generic clamshell-type mounts. Because many clamshell mounts fit existing engine mounts, they are very useful for converting a plane from glow power to electric.

COLLAR/SLIP-TYPE CLAMP MOUNTS

These mounts resemble a tube and have a diameter that's slightly larger than the motor's. Split on either side, the tube holds the motor in place, and a hose clamp tightened around the tube secures it.

Several companies make generic collar/slip mounts; they vary in both size and quality. The best one I've found is made by MaxCim specifically for MaxCim motors, though I've used it to mount motors similar in size. To secure the motor, it features a hose clamp that can be bolted to the firewall so you can move and adjust the motor fore and aft. The rear of the collar is machined to clear the motor bolts.

AstroFlight once made a similar mount that used a setscrew to secure the motor, and many vendors still stock this mount. These mounts work well, but the setscrew must be tightened occasionally to prevent it from marring the motor case.



This clamshell mount is made by MPI and can be used with a standard engine mount. It's great for conversions.



I used shims to fit this Aveox 27/39/2 motor (geared 4:1) in a generic slip mount from New Creations.



The AstroFlight mount on the left uses a setscrew to secure the motor. The MaxCim mount on the right uses a hose clamp to hold the motor.

CRADLE MOUNTS

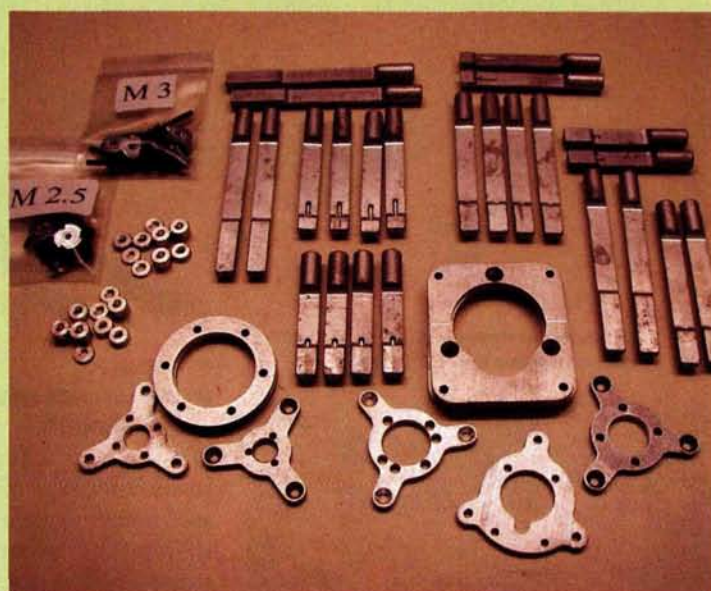
Hobby Lobby offers a wide variety of cradle-type mounts that fit all Graupner motors of similar size. These differ from other cradle mounts in that the cradle does not secure the motor. Instead, the rear of the mount is bolted directly to the firewall while the motor itself rests in the cradle and is bolted to the front of the mount. These mounts are light and effective, and they make motor replacement easier.

Aero-Vee makes a good aluminum cradle mount that fits a variety of motors. It comes with zip-ties to secure the motor as well as some lengths of Nyrod and screws that can be used to hold the motor (in a method similar to our homemade mount). Hose clamps can also be used to secure the motor to the mount. The Aero-Vee mounts are light, strong and versatile, and they're available through several electric-flight dealers, including SR Batteries.

AN ALL-PURPOSE MOUNT

The Super Universal Mount (SUM) system from Cambria Tool & Machine is the answer to many electric modelers' prayers because it is the first mount that can be considered truly universal. The system comes with various components; you simply choose which pieces suit your needs. I've tried mounting everything from Axi outriggers to Hackers with heat sinks, and they all fit perfectly. All of the components are machined out of 6061-T6 aluminum and are cut to fit particular bolt patterns. Each hole is countersunk to allow the 6-32 leg bolts to fit flush with the surface. In addition, the front holes are machined to fit precisely around the motor-bearing housings; this provides the motor with additional support beyond that afforded by the front mounting screws.

Thanks to the SUM system, changing motors is as simple as switching the faceplate or legs. I ordered a set of everything, and though I seem to have a lot more than I need, I also have a lot more flexibility than I would have with any other mounting system. If you're serious about getting things "just right," take a look at the SUM system.



Here is a full spectrum of SUM system components that will accommodate just about any motor. In the foreground are the faceplates and behind them are legs of various lengths.



You can see how—using the various components—three different Hacker motors with various gearboxes all fit the SUM. This is an exceptional mount.



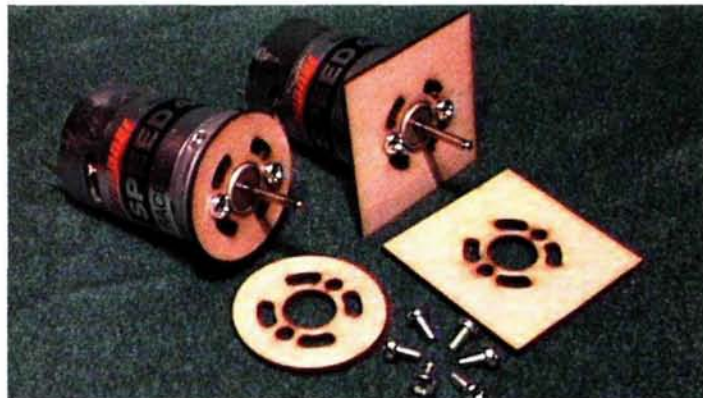
Two cradle mounts from Hobby Lobby: the one on the left holds the motor with screws going through the mounting holes; the other one uses a hose clamp around the mount and motor.



This Aero-Vee mount is nicely made and employs zip-ties or Nyrod to secure the motors.



The MEC gearbox on the left has mounting holes machined into the front of the box and comes with a template for cutting the mounting holes in the firewall. The Kavan mount on the right fastens to AstroFlight gearboxes and allows the motor to be mounted behind the firewall.



McDonough Products makes the laser-cut plywood mounts you find in many kits. You can buy them to adapt your own kits. They come with screws of the proper size for the can motors.

LASER-CUT MOUNTS

Many of the kits available today include a small, laser-cut plywood motor mount, but they're also sold separately by Hobby Lobby and New Creations R/C. These mounts actually become the firewall and come complete with the metric screws of the correct size to fit the can motors. These mounts make it easy to convert small planes to electric, and the round mounts are perfect for converting sailplanes.

CONCLUSION

There are nearly as many ways to mount motors as there are brands. There really is no right or wrong way to do it. When deciding on which mount and/or method to use in your next project, just remember that a good fit should be your number-one concern. ✚

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MANUFACTURER-SPECIFIC MOUNTS

Many motor manufacturers now design mounts specifically for their own brand. The beauty of these is that they fit the motor perfectly and require little, if any, thought on your part. When purchasing a motor, you might want to ask if they make their own mount for it.

GEARBOX MOUNTS

Gearbox mounts are actually gearboxes that feature mounting holes

The Inner Demon gearboxes feature their own mounting system that's built into the design. The legs are bolted directly to the firewall with blind nuts, and they support the power system.

or flanges. For example, Inner Demon gearboxes, made by Model Machining Service, have mounting legs that allow you to bolt the gearbox directly to the firewall. A blind nut behind the firewall holds the bolt securely. The very well-made gearboxes are available in two sizes and can accommodate up to two motors at one time.

Model Electronics Corp. gearboxes feature mounting holes in their faceplates and come with a template so you can cut the firewall to fit them. Kavan makes mounts that can be attached to AstroFlight gearboxes; this allows you to bolt the whole assembly behind the firewall. These are available through Hobby Lobby.

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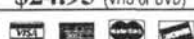
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Congratulations to Ed Solter of Mission Viejo, CA, for correctly identifying October's mystery plane as the Seversky EP-1, an export version of the single-seat P-35 fighter. Powered by a 1,050hp Twin-Wasp engine, the EP-1 (shown here in Swedish markings) featured retractable landing gear and was armed with two 0.3-inch Colt MG-40 and two 0.50-inch Colt MG-53 machine guns plus provisions for five 17-pound fragmentation bombs. Of 120 EP-1s ordered by Sweden, only 60 were delivered; they saw service under the Swedish designation S9. The remaining aircraft served the U.S. as P-35As, two thirds of which were destroyed during the Japanese attack on the Philippines in December 1941. ✚



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FINAL APPROACH



Maynard Hill launches the Spirit of Butts Farm on its historic flight.

PHOTO BY PAUL J. JEFFERSON

There's no ocean wide enough

Since man has taken to flight, he has always wondered how fast, how high and how far he could fly. Over the decades, many brave aviators have pushed the limits of man and machine to answer those questions. Maynard Hill has also asked those questions, but in a different arena—model aviation.

Some of you might recognize Hill's name; he has been mentioned in the modeling press for many years for establishing records with radio-controlled aircraft. During the past 35 years, he has set 23 world records; he flew an RC model to the record-breaking altitude of 26,990 feet, and he still holds that record. He also holds the duration record for a flight that lasted more than 33 hours and a speed record of 167mph in a closed circuit.

So it isn't a surprise that Hill set his sights upon a nonstop flight across the Atlantic Ocean with an RC model plane—and succeeded. On August 9, 2003, he launched the model from the rocky shores of Cape Spear, St. John's, Newfoundland, Canada, as his STAR (Society for Technical Aeromodel Research) team looked on; its destination: Round Stone Bog, Ireland. The route chosen for the model to fly was the same route as Royal Air Force pilots John Alcock and Arthur Whitten Brown took when they flew their Vicker Vimy WW I bomber across the Atlantic on June 14 and 15, 1919.

For the crossing to qualify as an official record under Federation Aeronautique Internationale (FAI) rules, the model had

to meet very specific design constraints. It couldn't weigh more than 11 pounds (4.9 kilograms) nor could it have an engine with



PHOTO BY RONAN COYNE

A triumphant team after a successful landing in Ireland. From left to right: back row—Enda Braodrick, Ronan Coyne, Dave Glynn, Tom Frawley, Noel Barrett, Joe Dible and Mrs. Barrett; front row—John Molloy, Dave Brown and Sally Brown.

more than a 10cc displacement. Hill designed a model that met these criteria and named it "Spirit of Butts Farm." Made of balsa, carbon fiber and fiberglass with CA and epoxy adhesives, it's covered in MonoKote and weighs 5.5 pounds without fuel. A modified, vintage, 4-stroke O.S. .61 engine that runs on gas provided the power. He used Coleman Lantern fuel because of its high energy content and because it burns cleanly. The engine also drove an alternator to provide electrical power for the electronics during the flight. A small battery provided power during launching and landing when the engine was shut down.

During the crossing, they didn't use a chase boat to guide the model. Instead, the model was packed with some very sophisticated equipment. In addition to a Futaba receiver and servos, a piezo gyro and a GPS receiver, Hill also installed two miniature telemetry transmitters. One of his team members custom-designed the autopilot that uses a microcomputer to process data from the GPS, the receiver, the pressure sensors and the gyro to adjust the three control servos. Prior to launch, a memory chip was programmed with waypoints for steering, and it contained data on desired altitude and engine rpm between these points.

To keep track of the plane during the crossing, they used the two telemetry transmitters; one provided short-range data to receivers at the launching and landing points to assess performance while the other transmitted signals to satellites that relayed the data to ground stations. The data was then shared via the Internet with teams on both sides of the Atlantic. The transmitted data included time, latitude, longitude, speed, heading, altitude and engine rpm and temperature.

After 38 hours, 23 minutes and 1,888.3 miles, AMA president Dave Brown sighted the model, regained control of it and landed it safely before a crowd of about 50 at Mannin Beach, County Galway, Ireland (not far from the original landing site of the 1919 flight). Congratulations to Maynard Hill and his team for a tremendous feat! ✈